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THE PERIOD OF RESISTANCE IN EARLY CHILDHOOD

ITS SIGNIFICANCE FOR THE DEVELOPMENT OF THE PROBLEM CHILD

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I. HISTORICAL REVIEW

Many children are known during the second, third and fourth years of life to go through a stage of development in which they are more or less resistive to adult direction and display an attitude of stubbornness, contrariness and spitefulness. This behavior, succeeding a time of relative submissiveness, has been referred to in the literature as the typical manifestation of an "age of resistance" or "period of negativism." German authors have used the term *Trotzperiode des Kindesalters,* that is the remonstrance or spite period of childhood. The reaction has been spoken of variously as a normal phenomenon, a character-shaping developmental crisis, a resentful response to all attempts at control, and a hostile turning away from all demands made by any one person or the whole family group.

Dr. Adolf Meyer and Dr. Leo Kanner made my entry into this country possible and provided the opportunity to further my research interests.

At the peak of this phase, the child is described as saying "No" to everything. He refuses to eat his meals, to go to bed, to take his bath and to go to the toilet. He rejects the games suggested and the food, clothes and toys offered and insists on asking for things which he knows are not available or are not for him to have. If he is out walking, he cries for his carriage; if he is in his carriage, he wishes to walk. If he is kept in the house in bad weather, he wants to be outdoors; if he is told to go out in good weather, he will not go. Everything displeases him, and his expressions of displeasure often take on explosive forms, such as shouting, crying or slapping, and may work themselves up to the vigorous outbursts known as temper tantrums.

Not only do most investigators take the existence of a resistive phase for granted, but they have tried to determine the time of its inception and its average duration. There is general agreement that it lasts several months at an age somewhere between 2 and 4 years. Thom [1] spoke of a group of children who show "counter-suggestibility" between 3 and 5 years of age. Many psychologists became aware of this contrariness by the observation of the frequency with which small children refuse to cooperate in test situations. Binet [2] called attention to the difficulties encountered in dealing with normal 3 year old children, attributing them to "timidity, bad mood or bad will." Gesell [3] remarked that 2 year olds are "most resistant to psychologic examination." Reynolds [4] found in a study of 229 preschool children that the height of remonstrance occurred before the age of 2 years, with gradual decrease from then on; no special differences existed in the reaction patterns of resistance at different ages, the main distinction being one of frequency rather than of degree or kind. Levy and Tulchin,[5] who observed 983 infants during tests, found resistance to be typically pronounced at 18 to 23 months in girls and at 30 to 35 months in boys, yielding gradually with age in both sexes. The earliest remonstrances, noted at 6 or 7 months, were crying and clinging to the mother. At 16 to 17 months, "assault" reactions

1. Thom, D. A.: Everyday Problems of the Everyday Child, New York, D. Appleton-Century Company, Inc., 1934.

2. Binet, A., and Simon, T.: Méthodes nouvelles pour le diagnostic du niveau intellectuel des anormaux, Année psychol. **11**:191, 1905.

3. Gesell, A.: The Mental Growth of the Pre-School Child, New York, The Macmillan Company, 1930. Gesell, A.: The Psychology of Early Growth, ibid., 1938.

4. Reynolds, M. M.: Negativism of Pre-School Children, New York, Contributions to Education, 288, Teachers College, Columbia University, New York, Columbia University Press, 1938.

5. Levy, D. M., and Tulchin, S. H.: The Resistance of Infants and Children During Mental Tests, J. Exper. Psychol. **6**:304, 1923; The Resistant Behavior of Infants and Children, ibid. **8**:209, 1925.

directed toward toys or toward the examiner and also head shaking and verbal objections made their first appearance. Latest to arrive were more complex modes of behavior, such as slapping movements without actual slapping and walking back to the mother in the midst of the test.

Various explanations have been offered for the resistive behavior of small children. Most authors consider it a normal feature of child development. Thom said: "The negativistic phase of the child's life is recognized as being a normal reaction occurring in the process of growing up. It is the period when the child begins to assert his own personality, when he resents domination by others." It is "a natural and healthy reaction." According to Wooley,[6] "negativism constitutes a very frequent state of development of personality. When a child begins to get a feeling as an independent agency, he enjoys trying out his powers."

Buehler[7] emphasized the emergence of "willing as a function of self." During the first two years there are no real acts of willing, but later the willing becomes a function which brings the child into conflict with those about him. "The willing takes possession of the child," and the resulting doubts, distrust, even hatred may assume the form of violent spite, exasperating enmity, passionate attachments and aversions. Hetzer[8] thought that children who do not remonstrate in preschool age will later be weak willed, unable to set a goal for themselves, incapable of carrying out tasks consistently.

Another interpretation came from Busemann[9]: The spite period, "an indispensable biological fact," is anchored genetically and is provided for in the chromosomes. Yet it is the mother's "birth rhythm" that really matters. Nature, said Busemann, has intended for women a birth rhythm with about three years interval between the arrivals of new offspring. If, contrary to this prescription, the next child fails to appear on schedule, the existing product suffers from "luxuriant educational activity" on the part of his mother. She has enough time on her hands to will and act for her child, who in turn, having developed his own volition and sense of power, rebels against this with stubbornness and spite. Hence, only-children and last children (*Nachkoemmlinge*) are especially exposed to the ravages of the "period of resistance."

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6. Wooley, H. T.: Enuresis as a Psychological Problem, Ment. Hyg. **10**:42, 1926.

7. Buehler, C.: Kindheit und Jugend, Leipzig, S. Hirzel, 1928.

8. Hetzer, H.: Entwicklungsbedingte Erziehungsschwierigkeiten, Ztschr. f. paedagog. Psychol. **30**:77, 1929.

9. Busemann, A.: Ueber das sogenannte "erste Trotzalter" des Kindes, Ztschr. f. paedagog. Psychol. **29**:42, 1928; Ueber die Ursachen des "ersten Trotzalters" und die Erregungsphasen ueberhaupt, ibid. **30**:276, 1929.

Other attempts at accounting for resistance took authors into theoretic realms. Haeberlin [10] compared infantile contrariness to the sulkiness and sullenness observed in the early part of the second decade of life. He was so greatly impressed by certain resemblances that he spoke of the preschool remonstrance as an indication of a "first puberty."

Buehler also found analogies between the two age periods, consisting chiefly of hostility to the environment and at the same time formation of strong attachments. She concluded that the similarity indicates the presence in infancy of a first spurt of sexual evolution, which then subsides to be resumed at the time of pubescence.

There can be little doubt that these statements are influenced by psychoanalytic conceptions. According to Freud [11] and his school, one observes a short "flourishing period of sexual activity at about the fourth year." Sexual inquisitiveness makes its appearance. In fact, all curiosity ("the impulse for knowledge and investigation") is fed by the energy which comes from the "looking impulse," the desire to see the genitals of the opposite sex. The first such experience evokes in the boy, who has presupposed in all persons a genital like his own, a "severe internal struggle," referred to as castration complex, associated with stubborn defense "against the contradictions which soon result" and fear of the loss of his own penis. The sexual object shifts from the erogenous zones to the outer world. The son, even as a small child, begins to develop an especial tenderness for his mother, whom he considers as his own property, and feels his father to be a rival who puts into question his individual possession.

Although this description given by psychoanalysts does not stress the essential features of the period of resistance, there can be little doubt that Freud and his school looked at the same picture. This is a time during which the 3 or 4 year old child is ruled by deep emotions and instincts. Manifestations of hatred and passionate affection are encountered, and more or less distinct manifestations of sexuality. It is found that this resistant phase of life arises out of a state of calmness and is concluded by relative tranquilization. The consensus is that this period is one of decisive crisis concerning the future development of the child. Furthermore, there is unanimity in the opinion that this phenomen is present not only in so-called abnormal but also in the majority of normal children.

My own work in the past thirteen years has tended to show that these early remonstrances are indeed significant for the study of the dynamics of personality development. This work is based on investiga-

10. Haeberlin, K.: Wege und Irrewege der Erziehung, Basel, 1918.

11. Freud, S.: Three Contributions to the Theory of Sex in The Basic Writings of Sigmund Freund, New York, The Modern Library, 1938.

tions carried out for years at the Children's Home in Ebenhausen, Germany, near Munich. The arrangement has the advantage over studies made at child guidance or other outpatient clinics that the children were under twenty-four hour observation. They could be studied in various situations, at all times; during meals, play and occupation; alone, with children and with adults; before, during and after visits from relatives; during illness; when pleased and when displeased; in placid mood, angry and frightened. Reports made by more or less biased adults were thus supplemented by direct and unprejudiced living contacts with the children, and at the same time a constant connection with their families was maintained.

As a result, a comprehensive study of behavior in early childhood, its manifestations, its relation to educational measures and its significance for personality development was published in 1930 as a monograph [12] entitled "The Origin and Dynamics of Childhood Neurosis." In addition to this material, obtained at the source, it has been possible in the past two years to make a follow-up investigation of children seen from four to eight years before at the children's psychiatric service of the Johns Hopkins Hospital. Hence, I am in a position to present an account of children's early remonstrance at the time when it occurred and formed the nucleus of parental complaints and also a record of subsequent events and developments in the course of several years.

II. PRESENTATION OF CASES

This study has been based on the cases of 167 problem children between the ages of 1 and 5 years observed at the children's psychiatric service of the Johns Hopkins Hospital and also on the cases of 40 children observed at the Children's Home in Ebenhausen.

The following case presentations have been selected from the records of children who were under twenty-four hours' observation. They have in common the fact that resistive behavior stands out as the central focus of parental complaint. Some of the selected reports may appear to be caricatures and exaggerations of the condition more commonly encountered. Yet such situations are by no means infrequent and, in fact, represent the bulk of the preschool problems brought to child guidance clinics. A study of the background of the period of resistance, however,

12. Benjamin, E.: Gundlagen und Entwicklungsgeschichte der kindlichen Neurose, Leipzig, Georg Thieme, 1930; Neurose und Psychopathie, in Lehrbuch der Psychopathologie des Kindesalters, Zurich, Rotapfel Verlag, 1939; Beiträge zur Pathologie der Trontzperiode und ihrer Prognose, Ztschr. f. Kinderpsychiat. **6**: 161, 1940; The Period of Resistance in Early Childhood, J. Pediat. **18**:659, 1941; The Period of Resistance in Early Childhood, read at the annual meeting of the American Psychiatric Association, Richmond, Va., May 5-9, 1941.

can be carried out only with material which shows the principal features in an exaggerated manner.

CASE 1.—Herman was a boy 3 years and 6 months old, the older of two children. His brother was 7 months old. Herman was very strong when he was born, and his development went well. Even as an infant he was restless, cried more than other children and vomited occasionally. This vomiting had been considered as a nervous symptom.

When he was 2½ years old his behavior changed completely. He became jealous to an extreme degree, cried until he became cyanotic and did just the opposite of what he was supposed to do. At the same time he was very fearful and anxious. He spoke of the devil and of Santa Claus, imagined he saw both and was very much afraid of them. Therefore, he could not go to sleep at night and asked to be taken into the bed of his mother, who usually did as he wanted. Herman was not able to eat by himself, never was hungry and had to be coaxed with his meals, which often lasted two hours. For this reason he got a concentrated diet. He was constipated; that is, he arbitrarily restrained his bowel movement because he did not like to be put on the chamber pot by anybody other than his mother. He vomited occasionally, apparently on purpose. He liked to join other children but did not get along well with them, wanted all their toys and always did as he wished. At home he had one friend whom he loved passionately and whose hands and feet he kissed when they were together. After meeting this child he did not like to go home and he became so excited that it seemed reasonable to put a stop to the meeting of the two children. Afterward he became nearly sick with longing.

Herman was jealous. His relations with his younger brother were "normal"; nevertheless he beat him frequently. He was ambitious, wished to be independent and wanted to act as the grown-ups did.

He had peculiar habits. He kissed his own body, especially his feet, licked his hands in a stereotyped manner and masturbated.

The mother beat the boy often but without improving his behavior. She did not think that she spoiled her child or that she was too much attached to him. Only during the last months she had observed that the child did not like to leave her and that he was too much attached to her.

Observation at the Children's Home.—Herman was a healthy but rather delicate child. During the first part of his stay there were unusual difficulties. It even became necessary to give him a special nurse and to separate him from the other patients. Without any reason he became extremely furious, beat himself and his playmates, threw himself on the floor and cried until he became cyanotic. He did not like to play with other children and played seldom by himself. He always wanted to have somebody who cared for him stay around him and put him on the chamber pot. He wished to be treated as a very small child. While there were no disturbances of sleep, the other statements of the parents could be confirmed. The intake of food was insufficient, and there was occasionally vomiting. The bowels moved only every second or third day. During his periods of excitement and also independent of these, the child performed the peculiar stereotyped movements described by the parents. Rocking his body, he licked his hands and his wrists. Masturbation was observed.

In a rather short time the disturbances disappeared, and the child was discharged after a stay of ten weeks. At this time he got along well; he was very independent and emotionally stable. His appetite became better, and the constipa-

tion disappeared. The stereotyped movements were still present but of minor significance.

The mother related that the favorable condition continued after discharge. Only with children there was a certain degree of self will and incompatibility present.

The father of this child was a healthy architect living in good economic conditions. He seldom lived with his family because he traveled a great deal. The mother was an excitable, emotionally unstable woman. For this reason she was unable to handle her child, although she tried hard. Neither in the maternal nor in the paternal family were there abnormal hereditary conditions.

CASE 2.—Mary was a girl 1 year and 7 months old. There were two brothers, of 8 and 4 years, and a sister, aged 6 months. During the first year the development of the child went well but she suffered occasionally from attacks of influenza. The closing of the fontanel was delayed. Dating from the third month of life there appeared a peculiar form of stereotyped movements, which in the course of time became extremely violent. Brought to bed, the child threw herself on her abdomen; then she squatted on her arms and legs and started to push her body forward and backward rhythmically as a machine. During the latter months this attitude always preceded sleep. It became worse after a heavy angina which the child suffered one month before admittance to the home. At the same time there appeared other symptoms. Mary, who had been clean up to this time, began wetting her bed daily. When not occupied otherwise she masturbated. This occurred during the day but especially before she fell asleep. She sucked her fingers more than before, and one could observe that she masturbated with one hand while she put the fingers of the other hand in her mouth. Sleep was restless and interrupted by crying. These symptoms were accompanied by strong manifestations of spite, which did not allow any further educational training. At the same time there developed a strong attachment to her nurse and distinct jealousy toward her younger sister. The development of speech was delayed. The child spoke only two or three words, and these indistinctly.

The stereotyped movements were a peculiar feature of the maternal family. Nearly all children of this branch suffered in this manner. One of the older brothers of our patient also shook in a similar manner during sleep or when going to sleep. He was a child who went through a heavy period of resistance and who presented now, when 8 years old, some remnants of this time of life. He was restless, tended to domineer and was inclined to tantalize our patient, of whom he was jealous. The 4 year old brother also made stereotyped movements, but they were easier to master and less disturbing. He was also tormented by his brother and got along better with his younger sister.

Observation at the Children's Home.—Mary was a rather delicate child. She was pale but otherwise healthy. There were distinct symptoms of rickets.

During the first days of her stay at the Children's Home there were considerable difficulties, not so much because of the relatively permanent manifestations of resistance but because of her behavior during the nights. As soon as the child was brought to bed she threw herself on her abdomen and for half an hour performed the movements previously described. Finally she went to sleep. If one tried to stop the movements the child started crying pitifully and began to masturbate. Masturbation alternated with the stereotyped movements. When the child felt that she was not kept in sight she put herself on her back, spread her legs, drew up her shirt and masturbated. Observed in such a situation she immediately

stopped masturbating and crawled under the cover. Feeling guilty apparently played an important part in this reaction. A short time after falling asleep the child woke up and the jerking, restlessness and masturbation were repeated. Sleep became quiet only toward morning.

Under these circumstances a treatment by medicaments became necessary. With the help of a mild opiate, Mary went to sleep more quickly than before. Her sleep became quieter. Under constant and careful supervision, which was far from brutal compulsion, the stereotyped movements became less accentuated. It was helpful to give the child when in bed a little toy dog, which she loved dearly. Enuresis was always present.

After several weeks there was a remarkable change in behavior. The manifestations of rebellion were no longer violent and occurred only occasionally. It happened, however, that Mary struck, bit or scratched in her rage, that she threw herself on the floor or that she shouted endlessly. Occasionally she occupied herself with some toy, but she was inclined to jump quickly from one thing to another. She was suspicious toward her playmates, but there began a certain degree of socialization. She wanted to be petted and spoiled and did not like to share with somebody else the favors of the adults. If the nurses did not pay attention to her she withdrew and either started the stereotyped movements or masturbated. Between the two she sucked her fingers.

At the same time enuresis disappeared. After several weeks the child went to sleep more quickly and without medicine. The habits which accompanied falling asleep vanished. The nightly rest, however, was disturbed by the child's awakening and remaining awake for some hours.

Later there was an improvement in this direction also. After a stay of three months there was no longer any masturbation either during the day or at night. Sleep was mostly quiet, and there were only some indistinct stereotyped movements accompanied by soft humming. This occurred especially when she awoke in the morning. Mary was now like a normal child. She was always cheerful, very much interested in the play with other children, very independent and manageable without difficulty. Thumb sucking was still present. The development of speech progressed quickly, but there was some unimportant retardation.

After some months there were no longer any difficulties. The enuresis had been overcome, the sleep had become quiet and the stereotyped movements as well as masturbation had greatly diminished.

This child was a descendant of a family of very high social standing. The pedigree could be traced back for many centuries. There were many abnormal personalities, especially on the maternal side. The parents themselves were reasonable and very cooperative, but the mother was undergoing psychoanalytic treatment.

CASE 3.—Herbert was a boy 4 years and 2 months old. He had one sister, 6 years old. His development as an infant was excellent, and there were difficulties only after an attack of dysentery when he was 18 months old. Since that time he suffered frequently from diarrhea and gained hardly any weight. Speech developed relatively late, and was defective at the time of his admission to the Children's Home. About the middle of his third year Herbert became difficult to manage. He did not obey and usually did just the opposite of what he was supposed to do. He was excitable and suffered from convulsions, which had been considered as breath-holding spells. He was inclined to dominate his mother, was jealous when she did not pay him enough attention and wanted her always

to put him on the chamber pot. When she refused to do so, he in turn refused to move his bowels. He was jealous also toward his sister. The fearfulness of the child was striking. There were good reasons for speaking of a kind of "nervous anxiety." He was afraid of animals and of Santa Claus; moreover, the anxiety was present during his dreams. The boy was restless. One year previous to admission a peculiar kind of shaking was observed, especially of the arms. It appeared when he was in a joyful excitement or when he was going to have a temper tantrum. There was also some salivation.

Herbert did not have confidence in himself, and he was a coward. He was still very dependent. In kindergarten he did not take part in the play of other children; he played by himself, mostly the same game in a monotonous manner. He masturbated and vomited occasionally. Enuresis had stopped one year previously.

Observation at the Children's Home.—Herbert was underweight, a delicate child, knock kneed and with a malformation of the chest (pigeon chest). There was a distinct but slight shaking of the body, which was especially marked in the arms and the head. The shaking became more distinct when the child got excited. The gait was stiff and clumsy. Examination of the nervous system did not bring out any important abnormality.

For a time after his admission to the Children's Home the remonstrance of the boy was obvious. He never obeyed, and the orders of the adults were answered by prolonged crying. In such excitement the child shook all over his body. When one was trying to make him concentrate the shaking appeared. The mood of the child was mostly bad. He was completely dependent and was unable to handle a spoon or to button his clothes. He relied on the help of the grown-ups, to whom he clung. He wanted to be petted and given preference. Herbert was jealous of the other children and frequently hit them. He did not care for the children his own age, disturbed their games and cried when one of them touched him. Then he turned to the adults. When they did not immediately pay attention he became greatly excited. In the bathroom he clung to his nurse anxiously, and he did not dare to use the apparatus in the gymnasium. Seeing it, he cried and trembled. Salivation and stiffness of movements were distinct. Sometimes he wet his bed. There was a general impression that the boy's behavior resembled that of a much younger child. Development of speech was retarded, and there were a deficiency of words and a defect in the formation of sentences. It was difficult to understand the child because he lisped.

During a stay of four months at the Children's Home the picture changed completely. At first the child enjoyed doing things by himself. Later he became ambitious and tried to help other children. The anxiety disappeared gradually, and there appeared a desire to join the group. Herbert became a favorite of the other children. He took part in all activities and was generally happy. His mood changed occasionally and unexpectedly, but remonstrance became less emphatic and the temper tantrums disappeared almost completely. There was always a certain degree of jealousy and rivalry toward the other children and the wish to be the center of attention. He enjoyed playing the "little one," clung to the adults and wanted to escape the rules of discipline. Salivation and shaking movements ceased, the speech improved considerably, the stammering disappeared and the formation of sentences became better.

The father of this boy was a healthy business man. The mother suffered from a depression the background of which was unknown.

CASE 4.—Bruno was a boy 2 years and 10 months old. He was an only child. During his first year of life his development went well but his speech developed slowly and he spoke indistinctly. Four or five months before he came to the home he had a cold, and in connection with it he became short of breath. The breathing difficulties lasted one hour, and they occurred also during the night. The physician thought that they might be asthmatic. The child coughed between these attacks. Owing to this illness the patient did not develop normally; he had no appetite and before admission he was taking hardly anything but water. Other food he took with disgust, and he vomited when forced to eat. He had been stubborn for a long time. Now the family was no longer able to stand it. When asked to do something he stamped his feet, shouted, became stiff, bit his hands in his rage, beat himself and knocked his head against the wall. Recently there had appeared a certain degree of shyness toward strangers. Because of his stubbornness he was often spanked and locked in a room by himself. This kind of punishment did not do any good.

Bruno was very affectionate toward his mother. At the age of 2 years he had stopped bedwetting, but now he wet the bed and his clothes occasionally. He sucked his fingers passionately and also had other bad habits.

Nine months ago the child had one convulsion which lasted nearly one-half hour and which was connected with a feverish illness. This convulsion passed without any damage.

Observation at the Children's Home.—Bruno was a pale, delicate child who breathed with obvious difficulties but showed no evidence of asthmatic bronchitis. During the night the breathing difficulties became more pronounced, and the child then slept restlessly. After a stay of two weeks at the Children's Home there appeared a bronchitis the asthmatic character of which was evident. Now the child had a high temperature and with its first rise there occurred a severe generalized convulsion, which lasted nearly an hour. After this incident the bronchitis disappeared quickly, breathlessness cleared up and the temperature became normal. In the course of three months Bruno developed well physically. His complexion became better, and his weight increased.

During the first weeks of his stay he was very difficult to manage. Sometimes he was shy and embarrassed and covered his face with his arms, but more frequently he became furious. He beat, scratched and bit himself, screamed continuously and threw himself on the floor. It was difficult to establish any contact between him and the other children. Bruno rejected them. He tried to get the undivided affection of the nurses. They had to hold his hands and were not allowed to occupy themselves with other children. His stubbornness was expressed especially toward the nurse who cared for him and to whom he devoted his affection. He loved a little monkey doll, which he took into his bed and without which he would not go to sleep. This toy appeased him occasionally during his temper tantrums. When he settled down he sucked his thumb. He sucked also while in bed and while going to sleep.

Speech was very defective and almost unintelligible. The only distinct expression was "not yet," which happened to be the answer to all demands.

Within two or three months the child's behavior changed completely. Spite reactions became less frequent, and they occurred only toward certain persons in his environment. Bruno was now generally obedient and easy going. He was a happy child who was enthusiastically engaged in his play activities and who joined the group of other children. He participated happily in their games.

He fought his own battles. His desire, however, to be the center of attention was evident. It manifested itself by his independence as well as by the fact that he tried to attract attention by antics.

The development of speech progressed more slowly. He still spoke indistinctly. There were difficulties, especially with certain consonants.

The favorable situation continued after his discharge.

The mother of the boy descended from a simple, hard-working family, while the father was a weathly business man. The marriage was unhappy. The mother did not care too much for the child. She had many other diversions, such as card parties, social meetings and "boy friends." The maternal grandfather suffered from asthma. Diabetes was present in several persons on the maternal side.

CASE 5.—Susi was 2 years and 6 months old on admission. She had a sister who was 13 months old. During the first year of the child's life there were many difficulties concerning her bringing-up. She was troubled with loose bowels, and she did not like to take the bottle, which she rejected for weeks. Therefore, excellently trained nurses were engaged for her. Nevertheless she lost her appetite. Her feeding was a trial for all concerned, because she continually fussed and cried. Ultimately the scenes were accompanied by vomiting spells, through which she apparently sought to domineer those present by arousing their sympathy and concern.

From infancy the child was restless. Later she became resistant to an extreme degree. Taking a walk with her nurse, she ran away and threw herself on the streetcar tracks, compelling the streetcars to stop. She broke her sister's nursing bottle and poured the contents into the garbage can, saying that her sister should also starve if she herself refused her meals.

The family took this child to three or four outstanding pediatricians, but these consultations came to an unhappy end because the child could not be examined and instead destroyed in her rage some valuable instruments of the physicians. Finally she arrived at the Children's Home.

Observation at the Children's Home.—The mother brought her but was asked to leave very soon because there occurred one temper tantrum after another. At the first meal spinach was served, which unfortunately the child did not like. She looked suspiciously at the dish and shook her head. For supper the other children received cocoa. When our patient began to drink out of her cup, she observed that in it was the cold spinach from lunch. She put the cup on the table and observed the other children, who drank the cocoa with excellent appetite. Next morning breakfast went along in the same way; but when the spinach came on the table for the fourth time, for lunch, the child was willing to eat it. Later there were no more difficulties with feeding. Instead, the child began soiling her clothes, perhaps as a drastic demonstration against the rather cruel educational methods. The spiteful rebellion lasted nearly three months; then it disappeared. The little girl played well with other children and was no longer difficult to manage. But she was always a little fearful, did not like to be alone, clung to the adults and wished always to be the center of attention. After the patient was discharged her progress continued. The parents took home with them one of the nurses, who was able to get along with the child. But naturally the disposition for spite reactions was there, and it was still present when the child was 14 years old, although she was in other respects a nice and well trained girl.

There is nothing of importance to report about the family.

III. THE CLINICAL PICTURE

These case histories give a fair picture of the period of resistance in early childhood, but it should be remembered that for a time during the second, third or fourth year many children are resistant. The manifestations of that normal period of resistance are not at all alarming, and they disappear after several weeks or months. During this time of life the child is in a contrary state of mind, which manifests itself sometimes by stormy scenes of resistance. He is emotionally unstable, and there are perhaps manifestations of hatred and passionate affection toward persons in his environment. Many mothers tell about this difficult time of the child's life, but they do not ask advice of the child psychiatrist.

The case illustrations given seem caricatures of normal conditions. There are, however, many transitions between the normal picture and its exaggeration. Therefore, it is difficult or even impossible to distinguish between a normal and an abnormal period of resistance.

Undoubtedly resistance plays an important part in the picture. The children who show such resistance are antagonistic. They do not subordinate themselves to the will of their parents or educators. They have a strong will of their own and are inclined to do the opposite of what they are supposed to do. Frequently there ensues a permanent battle between the child and his environment, a battle which is decided beforehand in favor of the child. The most striking symptom of this struggle is the temper tantrum.

One child gets angry every time he is crossed. Another screams and yells at the slightest provocation. And in many cases there is a real storm of excitement leading to even more violent and explosive reactions. Many children throw themselves on the floor, bang their heads against it or against their mattress, slam doors, stamp their feet, throw things at people, direct their rage against themselves by striking themselves, attack adults or hit their mothers. Such severe temper tantrums may be climaxed by real convulsions.

The behavior of a small child during a temper tantrum resembles very much some primitive reaction, for example the storm of movements observed with infusorias and the fluttering of a frightened little bird which has caught itself in a room and flutters against the walls and windows in a state of extreme and senseless anxiety. There is no thought in this child about his reactions; all is instinctive, emotional and very primitive. It seems that the child is ruled by some strange power, and it happens even that children themselves say that "the devil" got into them and that they wish to be rescued from this "evil."

It would be easy to describe the period of resistance if there were only resistance and nothing else. He who studies these histories care-

fully, however, will soon be convinced that resistance is only a part of the whole picture. The most impressive reactions of spite are nothing more than a screen behind which something else is lying. Behind the mask of spite reactions there is always anxiety or inner insecurity. Whoever has the chance to observe children from early morning until night will soon recognize the importance of these phenomena. In the case of one child, the mere thought of Santa Claus causes boundless eagerness to arise. In the case of another, the swallows flying through the house become a source of fear. A third trembles while walking to the gymnasium, clinging to the adults and crying when ordered to perform a harmless exercise. One could also tell of how suspiciously and anxiously a child meets his playmates, how darkness, uncanny noises, dogs and other harmless animals arouse his anxiety, and how these things manifest themselves during sleep and in dreams.

Such anxiety is not always obvious, but it is always present. Two and 3 year old children of this disposition are often in a terrible state. Anxiety governs their lives entirely. Both day and night this anxiety is present, and sometimes the unhappiness of the child expresses itself clearly in sad and tormented features.

Anxiety, indeed, is of great significance in the understanding of the period of resistance. It would be possible to present a continuous sequence of histories beginning with descriptions of impressive reactions of spite and indistinct symptoms of anxiety and finishing with pictures in which anxiety is so distinct that it obscures the spite reactions which are present in the background. I wish to report two histories as samples of the latter type of atypical period of resistance. Both concern girls, and I assume that this type of reaction is more frequent with girls than with boys.

CASE 6.—Edith was a girl 4 years and 2 months old. She had one brother, 10 months old. Early in life she suffered from pylorospasm. She developed slowly physically and always presented a feeding problem. Because of her illness she was very much spoiled by a nurse who cared for her for several years. This nurse took the child frequently into her bed. At the age of 2 years there started a disturbance of sleep which continued with variable violence until the time of the child's admission to the Children's Home. For some time she had not fallen asleep until 2 a. m. As long as she lay awake, she was extremely excited and cried lamentably. When the mother took her into her room she settled down and went to sleep within a short time. Then came a period during which the child fell asleep more quickly but awoke after a short time and became naughty and stubborn. During the last month the sleep had improved. Impressive was the difference between her obstinate behavior during the night and her behavior in the daytime. During the day Edith never revolted. She was even abnormally submissive. She was not very lively, preferred to play by herself and was not too much attached to her mother or her father. There was no jealousy toward her brother. Her anxiety was striking. She was afraid of harmless animals,

especially flies. In bed she pulled at the woolen threads of the cover, and she sucked her fingers passionately.

Observation at the Children's Home.—The child was found to be physically healthy. She always tried to make herself the center of attention. Her vanity was obvious. One got the impression of self confidence, which actually was not there. On the contrary, the child was insecure and anxious. She was afraid of the swallows flying through the house, did not like to stay by herself, would always grasp the hand of the nurse and wanted the nurse to go to bed when she herself went to sleep. She wanted to be petted and was very responsive to affection and love. Edith did not like to play with other children and preferred to play by herself. Her clever remarks did not mask the fact that she did not reach in some directions the developmental level of her age. Sometimes she spit bits taken into her mouth back into the plate. Maybe spite was the reason for that. But Edith was generally pliable and easy going. During the first nights it was almost an hour before she fell asleep, and when she did sleep she was a little restless. These residues disappeared soon. Only once was there something of a nightmare.

After discharge the child went to sleep late only during the first night. According to our advice she was placed in another bed, and the disturbance disappeared completely.

The father was a nervous person who worked too hard. He usually came home from his office very late. The mother was a former kindergarten teacher. She was impatient, excitable and vehement. In the parental family there were many persons who suffered from various nervous symptoms. Among them were also disturbances of sleep. A maternal uncle had suffered since childhood from migraine and hay fever.

CASE 7.—Charlotte was 3 years old. She was the second child of two. Her brother was 4½ years old. From the beginning of her life she had been delicate. A severe attack of whooping cough had been detrimental to her development. She had recovered from the whooping cough three months before, and the coughing attacks had stopped. Several weeks later, however, there appeared new attacks of coughing, which took place especially when the child cried or even during the night.

At an earlier time Charlotte was occasionally stubborn because her grandparents spoiled her. Shyness and embarrassment, however, had been always in the foreground. There were difficulties with feeding, and the child still always took the bottle and refused solid food.

Observation at the Children's Home.—Charlotte was a delicate, underweight, pale child without evidence of any pathologic condition. She coughed vehemently, the cough completely resembling whooping cough. During the attacks she became cyanotic. The attacks occurred only when something did not suit her. Charlotte refused the usual diet but wanted sweet and fluid food. When solid food was given she swallowed the wrong way, choked and then had an attack of coughing.

The behavior of the child was not especially striking. She was not yet accustomed to the company of other children, and she played at first mostly by herself. In a short time, however, she got along better with the group. In spite of a little stubbornness (which could be overcome easily), she was not difficult to manage. Feeding difficulties as well as attacks of coughing disappeared within a few weeks.

With these two children the relations between spite and inner insecurity are a reverse of the typical picture of the period of resistance. While usually distinct and striking symptoms of resistance conceal all other traits, in the cases just reported the scene was ruled by shyness and timidity, submissiveness and embarrassment, or even by sad and depressed moods. Spite seems to have been only the delicate and hardly recognizable background of the picture. These children did not present difficulties which were based on rebellion against the demands of the adults; on the contrary, it was generally easy to get along with them. Remonstrance sometimes is shown only by symptoms such as feeding difficulties or nervous coughing. We observed this with one of the children, who never rebelled during the day and who obeyed willingly but who became stubborn during the night when sleep would not come. According to such experiences we have to consider the possibility that there might be an atypical period of resistance without the characteristic emotional reactions or even represented only by a single symptom, such as disturbance of sleep or speech, enuresis or a feeding difficulty.

Temper tantrums and other reactions of spite are understandable only when one looks behind the screen of these manifestations. They are most impressive phenomena, indeed, but nevertheless they must be studied in proper perspective. Temper tantrums seem to be really something of a show. The child is playing the part of a wild man, and most adults will be deceived by his attitude. This type of behavior is not at all a special feature of childhood. It is encountered also with adults. Imagine two men in a discussion in which they become somewhat excited. Suddenly one of the men loses his composure, bangs his fists on the table and shouts, falling into a real temper tantrum. In such a situation one can predict with great accuracy that this man does not have the best arguments and that his behavior is caused by his inner insecurity. Nobody who can defend his case with good arguments falls into a temper tantrum.

The assumption that spite is a phenomenon of only secondary importance and that anxiety and inner insecurity are of greater importance reminds one of the doctrine of Alfred Adler.[13] He pointed out that inner insecurity is the basic feature of the neurotic personality. The child acquires inner insecurity during the first part of his life through a training which does not give him independence enough or which destroys his self confidence by corporal punishment, suppression and frustration. Because of his inner insecurity the child is not able to join the community and is a stranger in this world. The various nervous

13. Adler, A.: The Practice and Theory of Individual Psychology, New York, Harcourt, Brace Company, 1927.

symptoms must be considered as gratifications or compensations, the tendency of which is to indemnify the child by making him the center of attention.

Some of the observations of Alfred Adler are in complete accordance with my own observations. Many of these children are too dependent. Frequently they are able to do things by themselves, but they are not allowed to do so. Their wish to be the center of attention is obvious, and the histories I have obtained give ample evidence of this kind of behavior.

Alfred Adler was also right in pointing out that inner insecurity is important as well as the failure of the child to adapt himself to the life of the community. It is questionable, however, whether inner insecurity is the cause of lack of social adaptation or whether lack of social adaptation is the cause of inner insecurity.

The normal way which the child has to follow during the first years of his life is the way of the community. Even the infant has a few social tendencies. For example, he cries if another child is crying and he seeks contact with his mother. But these relations expand during the second or third year of the child's life. He begins to play with one or more children. Later he mingles with a larger group. The play must then have some rules, which are to be followed by every child.

Unfortunately, with the group of problem children under consideration there is another way. These children are not able to adjust themselves to other children. They have instead the tendency to quarrel with their playmates or hit them. Some children delight in teasing or tormenting their comrades by throwing things at them or are even inclined to bite. It is understandable that the other children won't play with these unruly youngsters and that they are afraid of them. Many are not interested in group activities. They do not like a group, prefer to play alone and stand around in the nursery school. Some children play well if they can be ringleaders; otherwise there is a fight. Others like to play only with younger or older ones because they can command the first group or put themselves under the protection of the second.

Another group are derided by their playmates because they are felt to be too anxious and bashful. The other children abuse and tantalize them, making quiet and peaceful play impossible. Sometimes it is not known whether the problem child started the trouble. It happens that children of this type tease or annoy their playmates behind the backs of the adults in a secret and malicious manner.

Speaking of social relations, I should mention the important problem of jealousy between siblings. In 40 to 45 per cent of the cases which I studied there were conflicts between the children of the family. The

parents say that there is a permanent fight, that the patient constantly annoys his brother or sister, that he likes to "make them holler," that he hides the toys of the baby so that the infant cries for them, that he takes away the baby's food. Sometimes the origin of a nervous symptom is related to the birth of a brother or sister: "When the baby was born he stopped eating, was moody, wouldn't take an interest in anything, would say no one loved him and wouldn't talk half the time. Whenever he watches the younger ones play he still gets very moody. He likes to hear people say he is nicer. He's always hitting the little one." (Karl, 4 years old.) The mother of 4 year old Bernice, who had wet the bed since the birth of her brother, said: "Bernice resents the baby quite a bit. She likes to eat out of the baby's dish. In fact, she acts like a baby, seeking attention. Before the baby was born, she was normal in every way. If I give the baby some attention, like holding her, I have to hold Bernice too. Bernice was not prepared for the baby's coming. It seemed to be a shock to her. If I punish Bernice for doing something, she will turn around and slap the baby, saying 'Bad baby'."

Frequently the patient himself is not jealous but the other children are jealous of him. Sometimes it is difficult to comprehend the situation because the observations of the parents in this direction are not very reliable. They say that the children are fighting as "brothers and sisters always do." There is, however, sometimes a serious competition between the children which gives the key for the understanding of the patient's difficulties. It even happens that the physician is asked to deal with the "wrong child," who is brought by his parents with many complaints. A careful personal observation, however, shows that the patient himself is easygoing while another child of the family is the real problem. The latter tormented the so-called patient in a secret manner which was overlooked by the parents. As a result the patient became difficult to manage and is now the "problem child" who is brought to the child psychiatrist for help.

Later it will be shown that within this group of problem children one deals frequently with only children. When there are brothers or sisters the distance of births becomes important for the problem of jealousy as well as for the origin of the period of resistance. The material from the Children's Home as well as the new American material shows that the period of resistance has something to do with the time between births. In the great majority of cases there was a short period between births (less than three years). This fact is interesting. Apparently the opportunity for becoming jealous is greater when the age difference is small. Suppose the first child was 2 years old at the time of the birth of the second child. Then the 2 year old child is not yet independent enough and he is in danger of being deprived of some

advantages he enjoyed. The attention of the mother will turn to the newcomer, who is now a "competitor" of the older child.

The problem of jealousy is important. It must be dealt with not only with regard to sibling rivalry but with regard to the relations of children toward parents and other members of their environment. Sometimes the child is jealous of his mother, who gets affection from the father, or of his father, who gets affection from the mother. Jealousy might be one of the outstanding emotions of the "neurotic" personality.

Only a few physicians will describe the anxiety of such children, the jealousy or other difficulties which are due to their inability to adapt themselves to the life of the community. But nearly all physicians know something about the so-called symptoms which seem to be much more important than anxiety or other similar reactions. These symptoms attract medical attention easily, but they are really only outward manifestations of the child's psychic situation. In this category are the well known and disturbing difficulties of feeding and forms of vomiting which seem to be rather arbitrary. One notices also the frequency of different forms of disturbances of speech, among which the more or less delayed development of speech, stammering and disturbances in building up sentences are prominent. Stuttering also plays its role. Delay in acquiring habits of cleanliness, manifested for instance by enuresis and encopresis, not infrequently belongs to the picture of this type of spite period as well as disturbances of sleep, which are also common, being manifested by nightmares, insomnia or anxiety dreams or otherwise. There is, moreover, the tendency to formation of habits and stereotyped reactions, especially thumb sucking, pulling and sucking on the bed linen or the lips, licking the body, scratching the skin and rocking the head during the night. Masturbation is also encountered. Motor inhibitions of different kinds are frequently present. There are also breath-holding spells the psychologic connection of which with spite reactions seems to be evident.

These symptoms are of great importance for the whole picture, because they indicate clearly that something is wrong with the child. The physician is not interested in the symptoms per se; rather he is interested in them because they prove that the patient is not on the right road to adapt himself to the life of the community and because he is afraid that his psychic development is in danger. The goal is to understand these manifestations, which have been called with good reasons a form of "speech of the organs." An analysis of the symptoms is nothing but a partial analysis of the whole personality. The explanation for it lies in the following facts: In childhood every emotion has an influence on the body. The small child jumps around and sings with great pleasure if he is happy. Contrariwise, he screams and cries and

hangs his head if he is sad or discouraged. The child is unable to hide his feelings as grown-ups do. Body and soul are in closer unity in the first years of the child's life than later. Therefore, during this time of life every emotion reacts openly on the body. Here there is an understandable explanation for the background of the symptoms.

Not long ago physicians became aware of the psychic origin of the symptoms. A real understanding of the symptoms is difficult indeed. Grown-ups are unable to feel and react as small children do. The symptoms are primitive reactions, primitive to such an extent that the child is able to deceive not only his parents but even sometimes the doctor, who is inclined to look for a physical background of the manifestations.

No wonder that in early childhood, during the period of resistance, nervous symptoms were present in every one of the cases included in my material. In a later period of life the symptoms do not play such an important part in the picture of the problem child. Most of the patients I have observed have been taken to the physician not because of educational difficulties but because of symptoms such as feeding difficulties or enuresis.

IV. COMMENT ON SOME OF THE SYMPTOMS

A few of the commoner complaints will be discussed here in some detail.

1. *Feeding Difficulties.*—Children with feeding difficulties make up the bulk of the clientele of the pediatrician.

There is hardly a single manifestation of the problem child that has come to play so universal a part in the present day culture, that has vexed parents and physicians so much and that has been discussed so frequently in homes, in clinics, in books and in lectures as refusal to eat. The older textbooks spoke of "nervous anorexia"; the family complains about "lack of appetite."

There is little doubt that there are children who suffer from "lack of appetite," especially during or after certain diseases (for example, tuberculosis and whooping cough) or as a constitutional peculiarity. Some of these children never will become heavy eaters. But for the great majority of this group there is another story.

Some children are capricious about food. They eat only things they like. Others are difficult to accustom to new dishes. It is hard to wean them from the breast or the bottle, and in many cases (13 to 18 per cent in my series) one encounters a prolongation of the infantile kind of feeding until the age of 5 years. Some children do not like to take solid food. All solid food has to be mashed. If solid food is given, the child chews it a long time but does not swallow the pulp, which remains for hours in his mouth.

Many mothers' conception of the quantity of food a child needs is erroneous. They think that a child does not take food enough, and they force him to get the food down. There ensues a battle between the child and his parents, accompanied by endless discussions, threats and punishments. As a drastic example let me present a breakfast scene observed with a 5 year old boy whose father recorded it carefully while sitting in an adjoining room.

8:15 : A cereal is being served for breakfast.

Mother: (Much coercing, yelling, threatening.)

Martin: (Crying, almost vomiting, refusing to eat, threatened to be put to bed.)

Mother: Did you get me out of bed for this? Tomorrow you can holler for your breakfast all day long, but you won't get it. You are going to eat this whether you want it or not. (Pause.) Hurry up! You are going to sit there all day until you eat.

Martin: (Cries.) My stomach hurts. I don't want it. I won't eat it.

Father: (From adjoining room, to mother.) Don't start any feeding methods! The doctor said to wait until he gets well. Don't force food! Take it away! (Diverts the child's attention until he stops crying. To Martin.) Your stomach has plenty of room. I'll feed it, and as you eat the wheaties I'll ask the stomach if it has room. Stomach says: Come on, wheaties! . . . Thank God!

(It is now 9:35. Soft-boiled egg. Father leaves dining room to listen from adjoining room.)

Mother: (Pleasantly conversing with Martin.) Go on! Hurry up! Keep it up until you are finished! Don't look around! You won't make me mad again. Don't talk to me!

Martin: Too much salt.

Mother: (Disgustedly.) Aw, you!

Martin: See this?

Mother: Watch what you are doing! Is it any wonder that you get everything all over yourself? Can't pick them, can you?

Martin: I'll get 'em.

Mother: Come on! Hurry up! You move so slow no wonder you give it a chance to get off your spoon.

Martin: I get it in my tummy.

Mother: We gave him the works.

(Egg finished at 9:46 to 9:49. Chocolate milk offered.)

Mother: Go ahead! Drink it!

Martin: Stomach hurts.

Mother: Keep drinking! Go ahead!

Martin: My stomach.

Mother: (Puts her hand on Martin's abdomen.)

Martin: (Drinks a little. Puts glass down.)

Mother: Never mind massaging the stomach! You never see people rubbing stomachs in a restaurant. I'll take you back to the hospital. I'll take a blanket, wrap it around you, take a cab, and they'll straighten your stomach out.

Martin: My stomach is upset.

Mother: Pick the glass up! . . . Pick the glass up! . . . Pick it up! Without that sour puss. Well, do you want to go outside? You have been sitting here two hours. You want to sit here another hour?

Martin: My stomach.

Mother: I don't think it's your stomach. I think you ought to have your head examined.

Martin: Stop hollering at me!

Mother: Drink it down!

Martin: I can't.

Mother: Yes, you can. You want me to put it down your throat?

Martin: (Crying and whimpering.) I don't want.

Mother: Go on! You want me to give it to you?

Martin: Please! Please!

Mother: Don't set it down so much! Pick it up! Pick it up! I said: Pick it up! (Martin cries.) That means nothing to me. I am used to seeing that mug.

Martin: (Tries to belch.) I can't drink it.

Mother: (Sarcastic.) I'm some sorry. Do you want me to cry with you?

Martin: (Yelling.) I don't want any more.

Mother: Shut up! You are going to drink it. You don't want to stay here. You want to go to the hospital.

Martin: No! No! I don't want to go.

Mother: Holler a little louder so everybody can hear you!

Martin: (Half crying and half yelling.) I don't want any more.

Mother: You are going to drink. I have plenty of time. I like to see how you get all full of spasms.

Martin: (Hits, kicks and pinches his mother.)

Mother: That's fine. I can take it. All nice boys do that. Good boys pinch, kick and hit their mothers and daddies.

(Two minutes of silence.)

Mother: Do you think Shirley Temple pinches and hits her mother? Do you think she would like it?

Martin: Yes.

Mother: I will write her a letter and see what she says. I will bet she'll want her picture back.

Martin: Don't write her!

Mother: Well, why do you do that?

Martin: Because I want to.

(Follows five minutes of silence. Martin sitting and milk not finished.)

Martin: Go and do something and I'll drink it. You go and do your work!

Mother: I am going to sit right here until you drink it. You don't do what I tell you anyhow. Pick that glass up! Are you going to start all over again? Pick it up!

Martin: (Drinks some.) I want to take a rest.

Mother: How much more have you got?

Martin: (Wants to kiss mother, then finishes milk. Finished at 10:15.)

Martin: (Proudly.) Didn't I drink it up?

Mother: I won't forget that you hit your mother. Only bad little boys do that.

Scenes of this kind took place at mealtime three times each day, 1,096 times a year.

One must remember one's own experiences which show that a meal should be a pleasure and not a torture. Lack of appetite will never be remedied if parents continue their faulty procedures. But if parents follow the physician's advice and stop the coaxing, it can be predicted that feeding difficulties will disappear, although many of the children will never become heavy eaters. For pediatricians this matter is not so important, because they do not like to see stout children. A slender child with trained muscles is more welcome.

Feeding difficulties not only are prominent in frequency and in the degree of parental perplexity they cause but are more than any other disturbance likely to be carried over into later childhood if improperly managed. They figured in the complaints or biographic accounts of not less than 724 of 3,000 children referred for psychiatric examination.

2. *Vomiting.*—Gagging, vomiting, belching and complaints of a stomach-ache often accompany the parental efforts to get the children to eat. During the period of resistance and also later many children are able to vomit whenever they want to. The vomiting is not associated with an uncomfortable feeling or nausea. It takes place with considerable ease, and the child is able to continue his interrupted meal immediately after the vomiting. This type of vomiting is a characteristic phenomenon of infancy. Many healthy infants vomit in a similar way.

3. *Constipation.*—There is hardly anything that gives a resistive child so much power over his environment and keeps him so thoroughly in the center of domestic attention as do the routine functions of food intake and elimination. Those are ready opportunities which offer themselves daily. The refusals can be dramatized, varied, presented with noisy lacrimation or quiet sullenness. Many parents make it easy for a child to realize that, in view of their agitated concern, these performances offer the most fruitful field for assurance of his domination of the household.

The following brief reports show instances in which "constipation" has been a manifestation of general resistiveness.

Jerome M's aunt stated: "His bowels only move once or twice a week, but he won't take anything. He told me to get milk of magnesia but then he wouldn't take it." Jerome, an only child, "won't do a thing" at home. "If you will tell him to stop, he will just give you a crack. He won't mind. . . . He is contrary and violent. He'll say: 'Give me that or I am going to kill you.' He is a maniac. We can't do anything with him. We are black and blue the way he wrestles with us. Unless he gets what he wants he answers back and is stubborn and violent. We are afraid of what they will think in the neighborhood, and give in to him."

Margaret P's mother said: "She gets cathartics every night, practically all her life. She could not retain milk of magnesia. She got agarol, petrolagar, castoria. I have given her enemas, not so many; I usually use a suppository on her." Margaret has spent the major part of her four years keeping her mother busy with

noneating, vomiting, breath-holding spells, temper tantrums, crying in the daytime and at night and refusing to sleep alone.

Sometimes the stubborn retention of fecal masses is carried to a point when evacuation takes place spontaneously and the child soils his clothes not only at home but also while at play outdoors or being taken for a walk or on visits.

It is interesting to note that capriciousness in defecation, unlike the feeding difficulties, is much less apt to continue in later childhood. In the 3,000 case histories considered, there are only 94 stories of the type described in the samples cited.

4. *Disturbances of Sleep.*—The recurrent events in the daily routine of small children consist of eating, eliminating and sleeping. The nonconforming child has full sway in the waking time, when he can use capriciousness in eating and in defecation to his heart's desire to express remonstrance and to obtain attention. He soon learns that the afternoon nap and bedtime offer similar advantages. Usually in the case of "sleepless" children one is confronted with an unwillingness rather than with an inability to sleep. The problem may begin at a very early age. The minute the baby cries at night, some one is sure to rush to the crib and rock it, pick up the baby and carry him about until he again is quiet, take him into the parents' bed or turn on the light and dispense reassurances. These services, given voluntarily at first, may later be demanded persistently for many years. There are the children who wake in the middle of the night and call for mother because they "cannot sleep"; the mother goes to her offspring's bedroom and calms him or sits down near him or invites him to spend the rest of the night with her and, presto, the "insomnia" is over. The time of retiring is frequently made as dramatic as the mealtime. The child will not go to bed unless certain rituals are performed. Father must go upstairs with him and hold his hands until he has gone to sleep. Mother or grandmother must read to him. The door must be left open to make sure that he will not miss the arrival of any visitors. If any such desires are not complied with, he either cries or "fusses" or runs around the room, if he does not go to the length of throwing a full-fledged temper tantrum. The parents, "for the sake of peace" or in fear of what the neighbors may say, ultimately give in, and these bedtime performances are kept up for years. Some children are unwilling to retire under any circumstances. The histrionics begin as soon as the word bed or sleep is mentioned. Toilet sessions are unnecessary interpolated or, when really needed, unduly protracted. When the child finally does withdraw, it is with the victorious feeling that he is bestowing a special favor on his family.

Other children sleep restlessly. They talk in their sleep, roll and toss around and grind their teeth. The sleep is very light. Some have anxiety dreams. They see the grandmother who is no longer alive, see rats or dogs running after them and cry pitifully or scream shrilly. This happens usually when they are half awake. They do not remember in the morning that there was a nightmare.

Disturbances of sleep can be influenced successfully by change of environment, but the same is not true concerning pavor nocturnus. It is very obstinate. We suppose that it is based upon the anxiety of the child. Interestingly, many children with pavor nocturnus are not especially fearful in the daytime.

5. *Speech Difficulties.*—In my work at Ebenhausen as well as at the children's psychiatric service of Johns Hopkins Hospital I could not help but be impressed by the observation of the frequency in strongly resistive children of disorders of speech development. That this cannot be a mere coincidence is evidenced by the fact that no less than half of the 167 children studied had difficulties with their speech, mostly in the sense of late acquisition and faulty articulation, occasionally in the form of stuttering. Since a large majority were children who had good intellectual endowment, the large number of poor speakers is certainly far out of proportion when compared with that in any other group of children.

The relations of speech disorders to the picture of period of resistance can be understood only from the point of view of the child's social attitude. As Stern [14] pointed out, the development of speech has two roots. One of them is based on the hereditary conditions, while the other is based on the environmental influences. Both are interconnected. If one of these preliminary conditions is defective, speech can never develop properly. With our group of children the influences of the environment are noteworthy. We learned that these children have difficulties in adapting themselves to the life of the community. When there is a disinclination to join people speech does not develop as it should. Speech is the most significant method of communication between human beings.

6. *Breath-Holding Spells.*—Breath-holding spells are the only manifestations which are obviously connected with the spite reaction. A child, usually during violent crying, suddenly ceases breathing and does not resume respiration for about a minute. He almost always becomes cyanotic. Sometimes he may show signs of apneic distress, throw his arms and legs around helplessly and look about him with an expression of utter despair. The first episodes are usually connected with a

14. Stern, W.: Psychology of Early Childhood, New York, Henry Holt & Company, 1924.

frightening experience, but when the age of 1 to 1½ years is reached the incidents are practically always manifestations of anger. Breath-holding spells make their first appearance in the first and second years of life and are rarely seen after the fifth year. I quote a few observations reported by mothers regarding the circumstances under which the spells took place:

"When things don't go to suit him." "Whenever he is provoked." "Whenever he is crossed and told not to do something." "When she has a fit of temper." "When we refuse to give her anything she wants." "Every time she sees me go away; if I tell her I will be back soon, she does not have them." "When his wishes are not complied with." "The usual spell starts when you want him to sit in the high chair or anything like that and he does not want to do it."

7. The Undesirable Habits.—There can be little doubt that nervous children are more inclined to formation of undesirable habits than average children. Pulling the nails, sucking the tongue, scratching the skin, keeping fingers in the nose or mouth, rubbing the hands, pulling hair, grinding teeth are among many such habits that might be mentioned. Tics are seldom seen during the first years of life (11 cases).

Some children bump their heads against the sides of the crib until they go to sleep, or they roll their heads from side to side. This habit takes place sometimes when they are half awake or during sleep. Some children perform rocking movements during the daytime; they rock their bodies back and forth or rock their heads from one side to another. This habit reminds one of the so-called "menagerie-movements" of some animals which have been in a cage for a long time. Similar movements are encountered also with feebleminded or idiotic children.

Thumb sucking belongs to these habits. It is quite normal, indeed, during the first part of the child's life. There is a question, however, how long the child should be allowed to suck his fingers. If a 3 or 4 year old maintains this habit one should not say that one has to deal with an "abnormal" or "psychopathic" personality. Judgment should be based on the observation of the whole personality of the child and not on the observation of this habit alone.

Thumb sucking is an important feature, however, because it is possible to study the conditions under which this habit takes place. Nobody ever saw a child jumping around joyfully and playing happily while sucking his thumb! He does it only when he is going to sleep or when he is annoyed or bored. These conditions produce the understandable desire of the child to turn away. Thumb sucking indicates the desire of the child to withdraw from his surroundings.

Masturbation has been observed in 15.5 per cent of the boys and in 15.8 per cent of the girls. This figure seems to be rather high when

one thinks of how reluctant parents are to talk about this matter. The real percentage is probably much higher.

Occasionally there is given a description of masturbation: "Rubbing her genital region day and night as if she has some itching." "She puts her fingers in her vagina." "He does not masturbate with his hands but pushes himself between his legs and keeps rubbing." "He takes his hands and plays with his pee-pee." "He would buck, go up and down on his hands and knees." "She sits in a chair, keeping up a rhythmic kicking with her right leg. Will keep it up for one hour until some one stops her. When the mother does not hear her she suspects that the child is doing the kicking. She keeps it up till perspiration just runs off her." Some children masturbate with one hand while they put the fingers of the other into the mouth.

Naturally many parents are dismayed by this habit and start a kind of "therapy" which is detrimental to the child. "I catch him at it. I punish him and things like that. I even threaten to burn him. The older sister calls me when she finds him doing it." "I scold him and tell him the doctor would operate on him and cut his pee-pee." "I have told him that he would go crazy and go to the crazy house if he kept that up." "At night the mother puts a tight union suit on him and pulls his penis up in front of his stomach so he can't get it down."

It seems to be evident that this kind of "treatment" is much more noxious than masturbation itself.

Certainly there is some relationship between finger sucking and masturbation. Unfortunately it is not possible to study the background of masturbation with the same accuracy with which one observes the conditions by which finger sucking takes place. Children even during their second or third year are frequently well aware of the attention the adults pay to this habit. They conceal it effectively.

8. *Enuresis and Encopresis.*—Enuresis is a frequent complaint, especially during this time of life. The child must be trained for cleanliness, and this job is sometimes difficult even under normal conditions. Often enuresis has been present all the time; the children never stopped bedwetting. Sometimes it has ceased but has started again.

Spiteful wetting of the clothes or the bed or both is not unusual. In one child, the onset was definitely associated with jealousy attributable to the arrival of a new baby; the boy, who had been an only child until then, showed his resentment also in many other ways.

Some children use the functioning of the bladder as another welcome weapon in their fight with the adults. When they are taken to a store, to the movies or for a ride or when sitting or moving around in the physician's waiting room, there is always the possibility of attracting the mother's attention by announcing the desire to urinate. If this

is done by a child often enough, then one hears from parents sometimes the complaint that the child "suffers" from urinary frequency (*Pollakisuria*).

Encopresis is less frequent than enuresis because the solid feces are easier to control than the fluid urine and because there are stronger feelings of disgust toward feces.

A review of the symptomatology of the period of resistance shows that most of these manifestations are related to the child's inability to adapt himself to the life of the community. This is evident especially with some forms of feeding difficulties, disturbances of sleep, vomiting, enuresis, encopresis, speech difficulties and breath-holding spells. Frequently the symptoms are a manifestation of the fact that the child did not progress as he should. When the child grows older this aspect of the symptoms becomes more distinct. I pointed out that many of the symptoms of the problem child are understandable only when they are brought in relation to the child's development. They are based on reactions which are normal indeed during early childhood or infancy but which are later no longer in accordance with the age of the child.

V. THE PROGNOSIS

According to psychologists the period of resistance lasts several months between the ages of 2 and 4 years. Our experiences, however, prove that in many cases its duration is really much longer. The following history deals with a patient whose period of resistance started at the age of 2 years and ended at the age of 4½ years.

CASE 8.—Thomas was a boy 4 years and 3 months old. He had one sister, 10 months old, who was healthy. As an infant Thomas developed well. He walked and talked at the correct time but was unusually restless and cried more than other children. Beginning with his second year of life his psychic development became a matter of concern. Intellectually he progressed fairly well, but his educational training was hindered by his stubbornness, which continued until the time of his admission to the Children's Home. The parents said that Thomas had the most severe temper tantrums when 2 years old. The temper tantrums had been less severe during the last year. Nevertheless he was ruled by extreme stubbornness, which manifested itself by the fact that he was used to saying "no" to everything. The mother thought that he was suffering from a "stiffness of his will." The child always looked dissatisfied and did not enjoy the normal cheerfulness of childhood. He was not able to join the group, had no confidence in himself and said on all occasions, "I can't do it." Therefore he was very dependent. He wet the bed until a short time before he came to the home and did not tell when he wanted to go to the toilet. Occasionally he soiled his clothes. He slept poorly and sucked his thumb. The child had been spoiled by a nurse. The mother herself did not know how to handle him, and she alternated unsystematically between spanking and pampering. In this way, however, there arose a strong attachment between her and the boy, which manifested itself by the jealousy of the child.

Observation at the Children's Home.—The physical examination did not bring out anything of importance. The facial expression of the boy, which seemed to be stiff, distorted or even tormented, was striking.

During the first part of his stay Thomas was rather confidential and of cheerful mood. He seemed to get along well with the other children and was not very difficult to handle. Nevertheless it was impossible to approach him more intimately. He acted as a 2 year old child, was unable to concentrate, was very dependent and enjoyed by preference motor activities. He used to throw himself on the floor several times successively. His movements were not harmonious. Without paying attention to a question he answered "No" or said in a stereotyped manner "tu, tu, tu" or "bang, bang, bang." He was extremely fearful and trembled while walking to the gymnasium. He soiled himself during the day.

This rather favorable behavior lasted only for a short time. Then there took place the strongest outbursts of rage on all occasions. Thomas kicked people; he threw himself on the floor and refused all demands even if he could expect something pleasant. His crying resembled that of a very small child. Monotony and lack of expression were its characteristic features. Sometimes the boy refused his meals a whole day. His kind of playing was monotonous and it was confined to the play with a little piece of wood or a ribbon which he used as a railroad. Sometimes he was fascinated for a while by this game. If he did not enjoy it any longer he destroyed the games of the other children and attacked them. Mostly he awoke in the morning in a bad humor, and he asked frequently to stay in bed all day long. He slept restlessly, threw himself around, groaned and cried out. The relations to his environment consisted mainly of the habitual "No" or one of the other stereotyped phrases.

The intellectual endowment of the child, which seemed poor on account of his peculiar behavior, was normal. He was even a rather clever child who observed very well the weak points of his environment.

In the course of a few months there was some progress, which was interrupted, however, by set-backs. At the beginning he enjoyed doing some things by himself, for example, dressing and undressing. Later there appeared a certain degree of self confidence, which became manifest in the gymnasium. Finally the spite reactions became less frequent and less violent. It lasted, however, several months before the child could be discharged.

After his stay in the Children's Home, Thomas changed his attitude completely. He got along well with adults and with children and talked with them in a lively way. He was happy and emotionally well balanced, generally obedient, very independent and in many respects like a normal child. He had long since ceased soiling his clothes. There was, however, still a tendency to try to attract attention from the environment.

The improvement was permanent. Only toward his mother there was some contrariness. Asked to do something a little difficult, he used to reply: "I can't do that. I can't do a thing. I am too stupid. I am as stupid as a girl."

With this patient the period of resistance lasted from the second to the fourth year of life and was interrupted only by admission to the Children's Home. There the boy showed remarkable improvement. Many times, however, it is not possible to change the environment. Then one encounters children 6 or even 8 years old with all the characteristic features of the period of resistance.

CASE 9.—Rudolf was a boy 6 years and 9 months old. He was the only child of his father's second marriage. His step-sister was 13 years old. Since infancy Rudolf had presented a feeding problem. The development of speech was delayed. There was always an extreme stubbornness associated with temper tantrums. He threw himself on the floor and shouted until he became cyanotic. He did not get along with his mother, whom he hated. His rage was especially directed against her. He tormented her and did not want to be dressed by her. Other children did not like him because he attacked them. He took their playthings away and pulled their hair. He was afraid of all animals and of the dark, was dependent, talked in his sleep, sucked his fingers and masturbated.

Observation at the Children's Home.—During the time of his stay at the Children's Home he was found to be excitable. Outbreaks of rage were usual. He tormented the persons in his environment in a malignant manner. In the course of a few months, however, there was some tranquilization and he got along better with other people but bad relapses took place in the presence of his parents.

CASE 10.—George was a boy 8 years and 10 months old. He was an only child. When 3 years old he had temper tantrums and breath-holding spells. During this time he played mostly by himself and did not like other children. He wet the bed and masturbated. Intellectually he progressed quickly. At the age of 8 years there was a resistance which could be called "compulsive." In his wild rage he threw himself on the floor, beat himself and talked about suicide. He wished to be punished because of his disobedience, thought he had been possessed with the devil and that his parents should procure a new child instead of him.

Observation at the Children's Home.—George tormented his playmates, did not get along well with them, was restless, dependent and lazy and let other people do things for him. He occupied himself well, especially with technical things; his intellectual endowment was excellent and he was almost a child prodigy. His phantasy was vivid; he played the piano and even composed. He slept restlessly, had anxiety attacks with fear of dying and was afraid of being left alone. Sometimes he was enuretic and masturbated. He was attentive in school and eager to study. His physical status reminded one of adiposogenital dystrophy.

The reactions in these 2 case reports represent nothing more than a prolongation of the period of resistance of early childhood. At the age of 6 or 8 years the most severe temper tantrums occurred. At the same time there were manifestations of anxiety. The children were unable to join the group and presented symptoms such as enuresis, disturbances of sleep, masturbation and thumb sucking. The picture had not changed very much from the early years of life to the sixth or eighth year.

With some children, however, there is an important change in attitude. This kind of development is more frequent than the picture just described, at least with boys. The development of girls is more complicated and not at all transparent. This is only a part of the many differences between the "nervous" boy and the "nervous" girl.

CASE 11.—Kurt was a boy 10 years old. His brother was 14 and his sister 3 years old. As an infant he suffered from disturbances of digestion and from

papular urticaria. During early childhood he had been excitable and inclined to have temper tantrums, which had been directed especially toward his mother. He wet the bed until the age of 6 years and stuttered. At the time of admission to the Children's Home he was easily managed. The parents said that he was "introverted." Hearing noises he shrugged; he was afraid of gymnasium work, of riding on streetcars, of climbing stairs, of a swing and of all things which move up and down. He worried about the future, complained of stomach-aches and frequently woke up at night. Stuttering persisted, and occasionally there was enuresis. He was afraid of his father and did not get along well with his brother and sister.

Observation at the Children's Home.—The boy was anxious, demure, restless, talkative. He was very submissive. He avoided the other children. In addition to the occasional enuresis and the stuttering, there was a tremor, which was apparently dependent on psychic conditions.

In this case stubbornness and spite reactions of early childhood disappeared and anxiety or inner insecurity became the characteristic feature of the child's attitude. This kind of development, of course, is more frequent than continuation of temper tantrums through many years. I have already stated that "behind the screen of spite reactions there is always anxiety or inner insecurity." Observation of the development of many of our patients proves that this assumption is correct. When the screen of spite reactions has disappeared, the other aspect of the child's personality unveils itself, with his peculiarities, such as shyness, timidity, inner insecurity, introversion, depression, lack of courage, hypochondriacal features, sensitiveness or indifference.

With many of the patients, both those who continue to have tantrums and those who get over them, one observes an important and interesting kind of behavior which also goes back to the early years of life. Some children during this time of life seem to go backward instead of forward. They refuse to take solid food but prefer the breast or the bottle. They refuse to feed and dress or undress themselves; the mother has to do that job. They refuse to become clean and continue to wet or soil the bed or the clothes. They cling to the mother or the nurse and refuse to become independent.

This kind of behavior becomes even more evident when the child grows older.[15]

These children do not develop harmoniously. Some of their reactions are more or less behind the level to be expected at this age. Many parents are well aware of this fact. They report that "he is too babyish for his age," "that he acts like a small child" or that "he just does not seem to be up to his age."

It is not easy to give a complete survey of the picture presented by children whose development is not harmonious, because this is a very

15. Benjamin, E.: The Immature Child, Nervous Child, 1941-1942, p. 2.

large group of difficult children. Most important are relations toward the family group, especially the mother. The behavior of dependent children is well known. They are not able to dress or undress, are fed by the mother or are not relied on to walk to school alone. Many of these children sleep in the same room or even in the same bed with their mothers. Many of them are "cry-babies." They express their wishes in this primitive form, which is normal, indeed, for infancy or early childhood.

Frequently the social relations with other children are disturbed. It is characteristic that they do not like to play with children of their own age. They prefer to play with younger or older ones, because they can boss the first group or put themselves under the protection of the second. Many children of this type like to play by themselves and run to the mother for protection. Some children do not follow the rules of the games and become angry when losing.

The performance of these children in school is important. Among 257 school children of this type there were only 45 whose school work was satisfactory. The teacher feels that the children are too dependent and that they are unable to do their work by themselves. Others are reported to be restless, to play all the time or to walk around the classroom or crawl over the floor. They hold the class in an uproar, fight and keep the children laughing. Lack of interest, lack of attention, slowness and carelessness are characteristic features. They do not apply themselves and do not finish what they have started. The teacher has a hard time with a child of this type, because he must be watched constantly. A number of such children in the group I observed were even transferred to a special class. Intelligence has very little to do with such failures. The average intelligence quotient of the whole group whom I observed was 100, and the average intelligence quotient of the good pupils was 105 while that of the poor ones was 94. The failure in school undoubtedly is based on the child's immaturity.

One of the main conclusions reached in the study of the material of the Children's Home was the fact that the period of resistance was of great significance for the development of the patients. I pointed out that in 85 per cent of all cases the difficulties could be traced back to the early years of life. This statement has been based on the results of the retrospective analysis. The value of the retrospective analysis, however, is dependent on the ability of the parents to observe carefully the development of their offspring and on the recollection of events long past. With the material of the Children's Home I was in a fortunate position, because I dealt there mostly with families of the well-to-do. I did not succeed in confirming the findings with the material of the children's psychiatric service of the Johns Hopkins

Hospital, because this service is fed largely from the outpatient department and hence most patients come from poor, barely self-supporting or financially dependent homes.

The following study contains the results of the retrospective analysis. It is based on 42 cases of children who attended the Children's Psychiatric Service during the years from 1931 to 1934 and who were followed up from four to ten years.

The children were from 2 to 5 years of age at the beginning and from 7 to 11 years at the end of the observation. During the first years of their lives all the children presented more or less accentuated symptoms of the period of resistance, and these manifestations were the reason for their examination.

There were 24 boys and 18 girls. In many cases the intelligence quotient of the children changed during the time of the observation but there was not a case in which it was below 80 during the whole period. Several times the intelligence quotient was found below 80 in early childhood while later it was 82, 85, 89, 102 or 105. Unfortunately in 5 cases there was no mental examination either in early childhood or later. Mental examination during early childhood must be handled with extreme cautiousness. As I explained, some of the children were at first considered as mentally retarded. Some years later, however, the intellectual development demonstrated that the former statement was incorrect.

I report here 2 typical case histories of children who were seen seven and eight years after their first contact with the Children's Psychiatric Service.

CASE 12.—Vernon was a boy 3 years and 10 months old. His father was a printer who was nervous and who six years before had suffered a "nervous breakdown." The mother was healthy. Vernon was the second of two children. His brother was 9 years old.

He attended the clinic because of slow development of speech. He spoke single words but no sentences. His speech was indistinct. He was an active, restless, destructive child. He was also restless during the night. The child had violent temper tantrums during which he threw himself on the floor, shouted and hit his mother. His intelligence quotient was 78.

Seven years later he still presented a problem. He was fidgety, cheated while playing with children and was unable to get along with them. He was very excitable, was disobedient and told falsehoods.

The teacher used to think that he acted young for his age. He had to repeat one term in the first, one in the third and one in the fourth grade because he would not behave and do his work. He fought constantly with his playmates. He really presented a serious disciplinary problem in school if the teachers did not take a personal interest in him. His intelligence quotient was now 105, but the examiner got the impression that he acted much more unintelligently than his psychometric test rated him. His attention span was short. His play interests were those of a 6 year old child.

CASE 13.—Albert was a boy 3 years and 6 months old. His father was an electrician who was out of work. His mother was a nervous woman who could not stand any noise and slept poorly. He was an only child.

Albert was born by an instrumental delivery. Several months before he came to the clinic he began to have temper tantrums, was unusually agitated, was "awful nervous," blinked his eyes and twisted his face. He made funny and bizarre movements with his hands and feet, with occasional grimacing. His intelligence quotient was 110.

At the age of 7 years and 2 months he was sent home from school because of nervousness and vomiting. At home he was irritable and wanted to sleep with his mother. He was jealous of his father. If his father was nice to his wife, Albert came along with a big stick and went for him. The boy still had temper tantrums. In a children's home he was found to be a baby about dressing, undressing and washing himself. A 4 year old was tying his shoes for him. At first all he would do was stand around, make faces and grin. At this time the mother threatened to leave her husband and Albert.

When the child was 10 years and 5 months old, the school complained that he did not do his work. He fooled and played around. He repeated the first grade twice and was now repeating the second grade. He felt people were against him.

At the age of 12 years, seven years after the first contact with the clinic, the boy presented a terrible problem at school. The principal complained that his mother marched up to the school to interfere every time Albert was punished. The boy always did the exact opposite of what he was told to do. When school opened he stayed in the cloakroom. When school was over he stayed in the classroom. For spelling lessons he did arithmetic. He did only about 25 per cent of his work. He hit and pushed the other children.

For a summary of the follow-up study the group of 42 children was divided into four sections, according to status at the end of the observation.

In the first group (19) were children whose achievement in school was poor. They were inattentive and restless, liked to play rather than to work and fooled around. They had not yet an understanding of the significance of their school work, which was frequently careless. Many of these children did not get along well with the group. They were disturbing because there was a lack of social adaptation. Some seemed to have inferiority feelings, and they insisted that they were unable to do their school work. Others were difficult to handle because they were negativistic. A frequent complaint was that the child was not yet up to his age.

The second group (5) was a small one. These children were rather good pupils, but their behavior in school was peculiar. They were sometimes odd personalities who were timid or anxious, who were easily hurt by the other children and who were not well adapted to the community.

The third group (11) was composed of children of a type with which every child psychiatrist is well acquainted. The parents wonder why

the child gets along well in school. At home, however, there is another story. Here the child is hard to manage, disobedient and negativistic. There are sometimes temper tantrums. Some of these children are more easy-going but too shy, anxious or very childish. There are all forms of nervous symptoms, such as tics, feeding difficulties and nightmares.

The last group (7) was composed of children who had either no difficulties or only minor ones at school and at home. These children overcame the period of resistance without important remnants. It is remarkable that the intelligence quotient of these children was higher than the average intelligence quotient of the whole group. Apparently a high intelligence quotient helps to overcome difficulties.

The result of the follow-up study shows that after an interval of four to ten years only 7 out of 42 children did not present important remnants of the period of resistance. This is a significant key to our former retrospective analysis. As has been pointed out already, in 85 per cent of all cases the difficulties of older children could be traced back to the early years of their life.

A table of the results of the follow-up study is added.

There are, however, some necessary remarks. The number of children (42) was a small one, and it will be necessary to complete the study with a larger number of patients. Moreover, the period of observation was too short. I am anxious to know how the development of these children will proceed after childhood is over. Furthermore, this is a special group of patients. All of the children attended a clinic, and it is certain that the manifestations of the period of resistance were rather severe. A great majority of the patients were only children or children with one brother or sister. Our statements concerning development should be confined to this group of only children or children with one brother or sister.

VI. STATISTICAL TREATMENT OF MATERIAL

Situations as complex as those under consideration do not lend themselves particularly well to statistical analysis. The intricacies of family relationships, with all their emotional connotations, defy percentage tables and graphic charts. Yet there are a few numerical features which must be considered.

Approximately 3,000 children were sent to the children's psychiatric service of the Johns Hopkins Hospital between 1931 and 1938 because of a vast variety of behavior disorders. Those under 6 years of age at the time of their first visits numbered 706. Of these, 167, or 23.5 per cent, were brought with complaints of more or less violently resistive antics. The relative frequency would be much higher if one were to eliminate from the total the many seriously retarded and organically

ill children of preschool age who were automatically referred by the pediatricians for psychiatric examination. Hence it may be safely stated that vigorous refusals and remonstrances of small children furnish a considerable proportion of psychopathologic manifestations in childhood. It should not be forgotten that most of the 167 children reported on here presented major annoyances and were taken to the hospital when the parents and physicians had arrived at a deadlock, and that children with the milder degrees of infantile resistance usually do not reach the psychiatrist. It should also be kept in mind that many parents are willing to struggle and put up for a long time with a child's noneating, disobedience, temper tantrums and other forms of resistance, often contributing their own share to the continuance of the difficulties. Therefore, some of the children do not come to the clinic until school age, when the teachers find it impossible to cope with them.

There was in our material a preponderance of boys, who constituted 57 per cent of the whole series, as against 43 per cent girls. However, when the figures are broken down for each year of life separately, it appears that the girls had a slight lead in the second year and third year age groups and lost it to the boys from the fourth year on.

In surveying the case histories of the 167 strongly resistive patients, the investigator could not help but be impressed by the fact that a great majority had come from small families with not more than one or two children. Not less than 74 per cent of the boys and 90 per cent of the girls either were only children (28 per cent boys and 41 per cent girls) or had one other sibling. This feature becomes even more striking if one does not merely consider "onliness" strictly from a statistical standpoint but views as "only" children also those who, without being their parents' sole offspring, remain the only children in their households for a considerable length of time. This refers to the one survival from several pregnancies, the first born to whose family no children are added for a number of years, and the "late comer" whose brothers and sisters are considerably older. Often such late arrivals are indeed treated by their parents and senior siblings for all practical purposes as if they were only children. If sole survivors, first born with no second child following for years, and late comers are listed as only children, not less than 35 per cent boys and 51 per cent girls (42 per cent of the whole number) of the group of 167 little rebels reported on belong in this category. Not more than 11 per cent were from families with more than two children.

The age of the children when parents and physicians were sufficiently disturbed to seek psychiatric assistance shows an interesting curve. Not a single child was brought because of disturbing remonstrance before the end of the first year of life. The number then increased from the second (7 per cent) to the fifth year (37 per cent), when it reached

Age		Early Childhood		Age		Follow-Up Observation	
Yr.	Mo.	Complaint	I. Q.	Yr.	Mo.	Status	I. Q.
		I. Boys					
		A. School Work Poor					
4	1	Irritable; temper tantrums; bed wetting; restless in sleep; feeding problem; drinks milk but refuses solid food	86	8	1	School unable to get any work from him; impossible to arouse any constructive interest	106
2	9	Keeps his mother awake all night; vomiting; does not learn to eat solid food	100	9	1	School work generally poor; lazy, uninterested, inattentive	92
4	7	Temper tantrums; stuttering; feeding problem; does not care to play with other children	69	11	1	School work poor; lacking in social adjustment	82
1	11	Feeding problem; drinks milk only from the bottle; defecates in his clothes	?	6	10	Little interest in school; short attention span; does not do his work and never finishes it; great difficulty in getting along with other children	99
2	7	Says "No" to everything; speaks only a few words; nightmares	?	9	7	School work poor; dislikes studying; without interest; great difficulties in starting work and in keeping at it	99
3	6	Extremely excitable, disobedient; afraid of being left alone and of other children; troubled by restlessness and insomnia; feeding problem; vomiting	?	10	8	School work extremely poor; careless; daydreaming (in a world of his own)	100
3	6	Temper tantrums; unusually agitated; habitual masturbation	90	12	6	Does only about 25 per cent of his school work; terrible problem in school; does always exact opposite of what he is told to do	87
3	10	Slow development of speech; very restless; destructive	78 (?)	11	2	Very antisocial; teases and torments playmates; restless; school work poor	105
5	10	Temper tantrums; bed wetting; dependent; does not seem able to adjust himself to other children	90	11	0	Extremely difficult to teach, because of general immaturity; bad reading problem	90
2	1	Temper tantrums; behavior trouble	Normal	6	8	Failed first grade and is repeating now; extremely restless	?
3	10	Temper tantrums; wets bed and clothes; vomiting	87	9	8	Failed grade I A three times; now in a medium section of II A; school work poor; very slow in reading	?
3	5	Baby talk to a most exaggerated degree	?	10	1	School work very careless; he did not grasp anything for the first two years; repeated I B and II B and is now repeating III B	?
		B. Behavior Difficulties at School but Work Fair					
3	1	Fights with other children; excitable; destructive; restless; rocks back and forth	?	8	11	School work better than average; behavior odd; can never do anything in the orthodox way; he always manages to create a disturbance; very imaginative; has the tendency to get fixed on special ideas	?
3	5	Temper tantrums; bed wetting; periodic attacks of vomiting; ruminating; feeding problem	100	9	9	Regular progress at school; dreams; does not pay attention; restless (feeding problem, vomiting, bed wetting, always whining; picks on his little sister)	?

Age (Yr. Mo.)	Early Childhood Complaint	I. Q.	Age (Yr. Mo.)	Follow-Up Observation Status	I. Q.
	C. Difficulties at Home Only				
3 11	Absolutely negativistic; very excitable; cries a great deal; talks baby talk; restless; awake for hours at night	?	8 1	Extremely active; hard to manage; crying spells	110
5 0	Temper tantrums; easily excited; very nervous; feeding problem; sleepless; twitches his face and his shoulders	94	12 2	Tics; feeding problem; plays around instead of working (the teacher thinks the boy is nervous)	85
2 9	Drinks his milk from a bottle, eats nothing besides	?	9 3	Feeding problem; unruly at home; does not obey; does not make friends; always asking for suggestion as to what to do	?
4 3	Wakes up at night screaming; vomiting; very impatient with things; urinates and defecates in public	?	10 2	Pains around the umbilicus; restless, irritable; Polakisurie; without friends	?
4 8	Terrible temper; breath-holding spells; does not sleep well; nail biting; thumb sucking; afraid of anything; fights all the time with a 3 year old girl	?	8 8	Tics; feeding problem; occasionally encopretic; temper outbursts	?
3 2	Temper tantrums; breath-holding spells; bed wetting; wets his clothes; continually dribbling urine	?	10 8	Enuresis; playing truant; stealing; staying out late at night; ran away from home	107
5 0	Bottle fed until age of 2 years, 6 months; feeding problem; vomiting; does not sleep well; destructive; picks things out of garbage can and eats them; nail biting; fights with other children	75	10 10	Was in a children's home during last year; the past months has been disobedient; marked deterioration in his school work	102
	D. Without or With Minor Difficulties				
2 5	Temper tantrums; always says "No"; does not take solid food; bed wetting; soils himself	100	6 6	Does well in school; feeding problem	?
3 8	Timid; afraid to go to sleep by himself; not like a boy; in nursery school had difficulties in mingling with children; headaches with vomiting	82	10 3	Regular progress in school; does better than average work; vomiting episodes	110
3 8	Bed wetting; development of speech retarded	?	8 4	School work excellent, all right in every respect	101
	II. Girls				
	A. School Work Poor				
3 11	Projectile vomiting; backward in talking; cries a great deal; very jealous	75	10 4	School very hard for her; repeated third grade last year	89
3 7	Bottle fed until 2 years old; cries much at night; does not talk plainly; refuses to play with other children	100	10 4	School work poor; failing in some subjects; very inattentive; restless; talkative; in opportunity class but recommended for transfer to a regular grade	82
4 11	Crying a great deal; feeding problem; nail biting; complaints of pain in head	?	12 0	Poor work at school; only in third grade; would rather play than work	89
4 1	Temper tantrums; feeding problem; attacks of vomiting; complaints of pain in stomach; crying at night; nail biting	77	8 2	Repeated I A; failed II B; now repeating II B; placed in an opportunity class	85

Age		Early Childhood		Age		Follow-Up Observation	
Yr.	Mo.	Complaint	I. Q.	Yr.	Mo.	Status	I. Q.
2	7	Feeding problem; night terrors; wets herself occasionally	100	7	4	School work very slow; does not learn how to read; repeated I C; will probably have to repeat I B	?
4	1	Temper tantrums; talks baby talk; gets her milk in a bottle only; not interested in the play with other children; afraid of anything in sight	"Extremely retarded"	11	3	Work has usually been rated good but now she will not be promoted; tries hard but what she learns seems to go as through a sieve	91
4	11	Temper tantrums; crying spells with vomiting; feeding problem; restless at night; will not sleep in her crib but crawls into her mother's bed	84	11	4	School work poor; does not do as well as she could; very talkative; repeated II A and III A; popular with other children so that it interferes with her work; seems nervous	?
		B. Behavior Difficulties at School but Fair Work					
5	0	Feeding problem; vomiting; pains around stomach; daydreaming; nail biting	100	12	7	Promoted each year; work only fair; very peculiar child in actions and points of view; ideas seem to be disconnected (she will be writing about one subject and jump to some seemingly unrelated idea); not a mixer	?
5	0	Serious feeding problem; slow in other activities	?	10	9	School work good, but too timid to raise her hand; prefers to play with much younger children	109
4	4	Temper tantrums; cannot keep still; wakes up at night screaming; feeding problem; nail biting	90	11	3	Regular progress in school but careless; temper tantrums; wakes up at night and comes into her mother's bed; very fearful; nervous; nail biting	?
		C. Difficulties at Home Only					
5	0	Feeding problem; vomiting; bed wetting; restlessness; nail biting; fights a good deal with other children; scared to death of dark	87	12	5	Stealing episodes; takes offensive without apparent provocation; runs street with undesirable companions; neighbors complain about her insolence; nervous	?
3	3	Temper tantrums; bottle fed until 3 years of age; feeding problem; restless in sleep; puts her fingers in her vagina; afraid of dark	100	7	6	Report of the Children's Home: was not agreeable and did not get along with other children	121
3	0	Temper tantrums; feeding problem; thumb sucking; beats head against wall whenever she is crossed	?	12	4	Temper tantrums; high strung; defiant; very nervous; uses vile language	87
4	9	Still drinks from a bottle; eats very little solid food; bed wetting; crying spells at night; thumb sucking; afraid of dark	91	10	3	Feeding problem; vomiting spells; headaches	?
		D. Without or With Minor Difficulties					
3	7	Easily excited; restless at night; rubbing her genital region; jealous of her sister	102	10	8	Regular progress at school; pulling her hair while asleep	?
3	6	Temper tantrums; attacks of vomiting		10	0	Regular progress at school but not excellent	?
4	5	Feeding problem; lies awake for hours at night	100	10	8	Normal progress at school; eating habits improved but still leaves much to be desired	?
4	6	Temper tantrums; does not play with children; complains about being tired	?	9	8	School work mediocre; no complaints	?

its peak. In the sixth year, when many of the children had already entered kindergarten, relatively few (approximately 11 per cent), often at the insistence of the school, were taken to the children's psychiatric service with complaints of resistive behavior.

As far as intellectual endowment is concerned, a large majority of the children had average, only slightly below average or high ratings. A few fell in the borderline group, and only 2 of the whole series, both of them boys, had intelligence quotients of between 60 and 70. Through follow-up examinations in subsequent years, it was learned that the psychometric evaluation of the test performances of resistive children must be done with considerable caution. In no other group were there so many references to the unreliability of the results, regardless of whether the Gesell, Kulmann-Anderson, Binet-Simon or any other scale had been employed. This experience is in keeping with the reports of many psychologists. In fact, there were often entries in the case histories to the effect that, in view of poor cooperation, psychometric testing was desisted from as inaccurate and misleading and postponed to a more opportune time. In several instances the early test scoring at the height of the resistive behavior was so low that, judged on that basis alone, the children gave the impression of marked developmental retardation pointing toward future intellectual inadequacy. However, retesting a few years later produced average scores.

It may seem at the first glance that the economic status of the families from which the resistive children stemmed has no bearing on their type of conduct. The children's psychiatric service of the Harriet Lane Home is fed largely from the outpatient department, so that most patients come from poor, barely self-supporting or financially dependent homes. A tabulation of data on the first 1,000 patients referred for psychiatric examination showed that 8 per cent of the children came from families in good or excellent circumstances, 28 per cent from middle class parents or stably employed skilled labor groups and 64 per cent from poverty-stricken families. Of the 167 strongly resistive children, only one fourth came from families on relief, one half from homes in better than marginal conditions, and one fourth from comfortable, often luxurious homes. Infantile remonstrance therefore seems to thrive better in an environment of relative economic ease and convenience. This may be due in part to the well known coincidence of affluence with small size of the family and of indigence with prolific production of offspring.

Similar correlations existed between children's resistance and economic status on the one hand and the education and occupation of the parents on the other hand. Among the parents of the resistive children studied there has been a far higher percentage of high school and college graduates than is the case in the general population. This

percentage is altogether out of proportion to the type of parents represented at the children's psychiatric service, the large majority of whom have at best completed grammar school. Among the parents of the resistive children, there was a goodly proportion of lawyers, physicians, teachers, pharmacists, bookkeepers, insurance agents and salesmen.

Among the resistive children there were only 13 Negroes. This figure is very small compared with the percentage of Negro children who attend the clinic. With this group the preponderance of good intelligence and good formal schooling is very noticeable, as well as the small number of children of the families. There were 6 only-children and 3 children with one, 3 with two and 1 with four siblings. The fact, however, that the Negro population has generally more offspring than the white is well known.

I consider the observation described as a confirmation of my experiences which show that a period of resistance which requires medical help occurs mostly with children of families with a higher than average standard of living and with a small number of children. I suppose, furthermore, that "spoiling" might not be so important for the origin of the period of resistance, because Negro children are generally more pampered than the children of the white population. Nevertheless the period of resistance seems to be less frequent with the Negro portion of the population.

One is astonished to find that, far more frequently than in any other group of children brought to the children's psychiatric service, the mothers of the resistive children have been gainfully employed until marriage or even until pregnancy put an end to their working. They have been waitresses, salesgirls, office employees (10), nurses (6), teachers, music instructors, interior decorators, journalists (1), etc. Kanner [16] recently tried to show the relationship between these facts and the remonstrance of the children of those mothers, when he wrote:

> Many women nowadays come to matrimony and motherhood from the ranks of stenographers, salesgirls, nurses, teachers, factory girls. If the marriage turns out to be emotionally and economically disappointing, there is often compensatory toying with the idea of returning to work and the former interests and associates. Then comes the first pregnancy, either undesired or wanted as a means of cementing the brittle husband-wife relationship and giving to the mother a new content in life. With it, however, comes a realization of finality; the child's arrival is looked upon with mixed feelings as a trap and at the same time a promise of something more precious than a job. All the energies released by the abandonment of the job are centered on the child, who takes the place of the discarded typewriter or cash register. All goes well as long as the infant yields. But he soon ceases to be merely like a passive tool, and smoothness of functioning cannot be regained by

16. Kanner, L.: Cultural Implications of Children's Behavior Problems, Ment. Hyg. **25**:353, 1941.

means as simple as changing a typewriter ribbon or oiling a machine. The mother reacts with a burst of frantic activity, the child retorts with a crescendo of revolt, and a major war is on.

Many of the children studied have come from homes in which there was little harmony and much tension and friction. Some of the families had been disrupted by separations or legal divorces with preceding bickering as to which parent should have the custody of the children. But even in the majority of the families which maintained their social cohesion there were, according to the reports, matrimonial dissensions of sufficient harshness to create in the home an atmosphere of unhappiness, or at least absence of happiness. Sometimes the difficulties were aggravataed by the presence of critical or openly dissenting in-laws. Often the children themselves became involved in arguments centered around the question of child rearing.

VII. FAULTY METHODS OF EDUCATION

The development of human beings is determined by two principal factors: hereditary conditions and environmental influences. The former are like the material of a building, such as iron, steel, wood or stone, while the latter are responsible for the ground plan, the distribution of space, the architecture. A steel house can never have the same architecture as a house built of wood. The material is decisive for the work of the architect.

The same is true concerning the influences of heredity and of environment. The material is there and cannot be changed. But the educator is the architect who has to make the best of it. There is a big difference between a child who reacts with one temper tantrum after another and one who uses his energy for adapting himself to the community, between a child who becomes a queer and isolated personality and one who withdraws himself only sometimes to his phantasies, or between a child who soils or wets himself like a baby and one who is sometimes childish and desirous of being petted.

It is extremely difficult or even impossible to recognize the effects of hereditary conditions and to separate them properly from the influences of the environment. Psychiatrists did a great deal of work concerning the hereditary background of the mental diseases. The resulting information, however, was meager. Even less is the knowledge about the hereditary conditions of the psychopathic personality.

Unfortunately the problem of heredity is not only a matter of scientific discussion but also connected with the *Weltanschauung* of the respective scientist. It is sad indeed to observe a scientific problem being confused with problems of philosophy of life or even political issues.

There are some good reasons for assuming that heredity is important in the origin of the child's difficulties.

Frequently these difficulties can be traced back not only to the second or third year but even to the first weeks or months of the child's life. In this period there are feeding difficulties, vomiting, restlessness or disturbances of sleep. It is not probable that symptoms which manifest themselves during this early time of life are dependent on environmental influences.

Another point of view is based on the fact that there are remarkable relations between sex and the picture of the "nervous" child. Every child psychiatrist has to deal with a considerable majority of boys. Enuresis, tics, speech difficulties and so forth are more frequent with boys than with girls. The differences between males and females are almost a proof for the significance of inherent factors. Diseases or pathologic conditions correlated to sex are mostly based on a hereditary background.

Finally we have to mention the coincidence with some physical complaints which is not a purely accidental event. Many of these children have a predisposition for colds (tracheitis, bronchitis) and anginas. There is frequently a hypertrophy of the glands, the tonsils or the adenoids, in other words of the lymphatic tissue. Inflammations of the skin are not infrequent. There is a predisposition for vasomotor and anaphylactic phenomena. All these conditions belong to the picture of the "exudative diathesis" (Adalbert Czerny), the background of which is unquestionably hereditary.

The problem of heredity cannot be solved by statistical methods. With my earlier material as well as with the newer, I found among the families of 80 to 90 per cent of the patients nervous conditions of different kinds. This figure does not at all prove the significance of heredity. Accurate pedigrees of such children are still lacking.

From a practical point of view the whole problem is not very important. The therapy has to deal with environment. The assumption that heredity may be a decisive factor does not mean that one is unable to influence the course of the child's development. The hereditary background of a disease is no longer an obstacle to its successful treatment, since it is possible to cure rickets or diabetes, both of which have a hereditary background.

One of the most important factors of a child's environment is the parental attitude toward him. Some physicians even believe that adults' conduct is decisive in the child's development. "Education of the educators" has become the slogan. It is true that adult behavior helps to shape a child's pattern of socialization. In most of the cases of disturbing remonstrance that I have observed I have learned of adult

conduct that has noticeably and characteristically influenced the direction of the child's development.

Several types of damaging parental behavior can be discerned. They cannot be separated rigidly, since there is sometimes a confluence of motives in the individual educator or a divergence of attitudes in the father, the mother, one or more grandparents, uncles or aunts, a governess, etc., who take a hand in the rearing of the child.

Child Rearing Governed by Autocracy.—The object is to obtain blind obedience. The child is frightened into conformity by sternness, restriction, punishment, beating. Show of affection, leniency and willingness to compromise are barred as signs of weakness and spoiling. Meekness only is tolerated. Compliance is hammered into the child. His happiness does not matter. If a child resists, the parents react with a type of counter-resistance which makes full use of their superior physical prowess. To the child who is not cowed and crushed by such a regimen the world must come to appear as a place in which the bully reigns supreme. The bully therefore becomes the admired ideal. The child waits for the day when he himself will be strong enough to crush others. He complies fearfully and cowardly in the face of expected punishment but learns to take it out on those weaker than himself.

Child Rearing Governed by Submission to the Child.—The opposite extreme consists of excessive parenteral indulgence, which allows the child to be an autocrat. This type of education, decried as "spoiling" or "pampering," caricatured in cartoons, agreed unanimously to be disadvantageous to the child's socialization, is nevertheless common. Convenience is often the keynote of a laisser-faire arrangement which would rather continue "babying" the child than teach him how to do things for himself. The mother makes herself a slave to the child, jumps to attention at every one of his whims: it is she who is expected to obey the child; it is the child who directs her activities and "runs the house." At the same time, there is practically always the paradoxic combination of spoiling and nagging. We know of no indulgent mother who does not at the same time nag from morn till night. Threats which are never carried out, weak attempts at persuasion, coaxing, cajoling, "lecturing" and sermonizing are the mother's ineffectual methods of counter-resistance which serve only to accentuate the child's domination.

Child Rearing Dominated by an Overdose of Parental Affection.—This also results in "spoiling" submission to the child. It is practiced especially by mothers who are frustrated matrimonially, who have not found in the marital situation the happiness they had hoped for. All the ungratified affection is thrust with full force on the child, who is

"smothered" with "love." Esther L. Richards [17] has in a very instructive paper dealt with the background and effects of this mode of child rearing. Whether the pampering is based on peculiarly conceived convenience or on overaffection, the outcome is a delay of the child's emancipation and self dependence and a domestic autocracy of the child.

Child Rearing Governed by Lack of Affection.—Originally unwanted, unplanned for, "rejected" children are the most frequent recipients of this type of upbringing. The child is surrounded by an atmosphere of coldness, impatience and criticism, for which the mother, bothered by her conscience, tries to make up and overcompensate by bursts of agitation which are to prove her love to herself, the child and the world. Newell [18] has made valuable contributions to the study of maternal rejection and its effect on parent-child relations as well as on the behavior patterns of children so educated. It is early understood that a child has in his resistiveness a defensive-offensive tool with which he can keep his mother constantly occupied and preoccupied with himself. In fact, in this instance the situation is reversed, in that the resistance comes primarily from the parent, and it is the child who reacts with counter-resistance.

Child Rearing Governed by Fear.—There are many parents nowadays who, in their own insecurity and the general unrest of this era, are in a perpetual state of viewing with alarm, anticipating calamity and envisioning disaster, which must be "prevented" by all means. Frightened by radio broadcasts, magazine articles, pseudoscientific books, neighborhood gossip, they hover over their children with fearful fluttering. They are afraid of germs and the vicissitudes of weather. They are afraid that the child may not get the necessary amount of calories and vitamins, that he may not live up to the advertised standards of weight, basal metabolism and intelligence quotient, that he may "repress" too much or not enough, that an occasional departure from strict veracity may indicate future delinquency, that mild restlessness may be the beginning of "St. Vitus dance." Apprehensive eyes watch every move of the child, which is always interpreted in terms of dire prophecy. Hence the parent develops a false sense of obligation which is typically expressed in the recurrent phrase "I have to." The parent feels that she "has to" force her child to eat for fear that he may become undernourished, "has to" give him enemas and suppositories for fear of "constipation," "has to" leave a light on in his room at night for fear of

17. Richards, E. L.: Behavior Aspects of Child Conduct, New York, The Macmillan Company, 1932; Special Psychiatric Problems in Childhood, J. A. M. A. **95**:1011 (Oct. 4) 1930.

18. Newell, H. W.: The Psycho-Dynamics of Maternal Rejection, Am. J. Orthopsychiat. **4**:387, 1934.

"nervousness," "has to" supervise his outdoor play for fear of injury, "has to" bundle him up on a warm day for fear of illness, "has to" be around him all day and all night for fear of everything imaginable. She will not let him play with other children for fear of contagion. Such a child is regarded with the specters of invalidism, insanity and a criminal career lurking in his path. The contemporary emphasis on prophylaxis, instead of exerting its inherent, wholesomely optimistic influence, is misconstrued as pessimistic warning and sounding of alarm. Under these circumstances, a child has full sway with his refusal to eat, to defecate, to go to bed, to obey; parental counter-resistance is sure to keep the home in permanent turmoil with its agitated polypragmatism.

Child Rearing Governed by Dependence on Dogmatic Rules.—Frightened, uncertain, inexperienced parents are apt to lose all of their naturalness and reliance on spontaneity and seek advice from books and lectures. At every juncture, they turn to the chapter of the book pertaining to the issue of the moment. Those books are often written by humorless adherents of sectarian "schools," laying down the law to unsuspecting, defenseless parents. They are followed with a pathetic literalness which leaves no room for alternative and inventiveness. There is hardly anything more pitiful than the child who is "reared by the book." Any sign of infantile remonstrance is met with the particular brand of counter-resistance prescribed by "the book."

Child Rearing Governed by Parental Overambition.—There are parents who, instead of relying on the gradual unfolding of their children's potentialities, are from the start bent on making "geniuses" of them, overstimulating them with useless knowledge at an age when the "knowledge" can be nothing but rote reproduction without symbolic meaning to the children. A child is prematurely stuffed with the names of the presidents of the United States, the capitals of the forty-eight states, poems and psalms. He is prematurely "thrown into society," "prepared for a big career," and at the same time is kept from learning how to play naively and naturally. Often retarded children are made the victims of attempts to "pep them up," and since they do not respond as is expected of them, resulting impatience creates and perpetuates a battle in which both parents and children are thwarted and unhappy.

Child Rearing Governed by Parental Inconsistency.—Tactics are changed in accordance with parental moods. Today the child is showered with indulgence; tomorrow he will be punished severely for acts which have previously been condoned or even admired as "cute." Or there may be a clash between strictness on the part of one parent and spoiling leniency on the part of the other parent or of a grandparent. Nothing is more inviting to a child under such conditions than to play one adult against the other for his own benefit.

It must be stated emphatically that all these faulty methods of education are carried out by well intentioned parents, who are themselves caught in the traps of emotional difficulties and quandaries. It must also be said that not every child allows himself to be spoiled, terrorized, completely derailed from the tracks of adequate socialization. But a child's efforts to emancipate himself when emancipation is made difficult, to develop perspective in an atmosphere with distorted perspective, to develop tolerance in an intolerant environment, require resistance, often justified and healthy resistance, which in turn continues the domestic hostilities.

Besides the parental attitude toward the child the physician is interested in quite a few details of the environment. It is known that the parents alone are seldom responsible for the educational job. There are apparent or secret co-educators, such as grandparents, aunts, uncles, boarders, housemaids, neighbors, nurses and governesses. Other children, especially siblings, help to shape a child's pattern of socialization. The atmosphere of the home is important. It may be quiet or restless, peaceful or disturbed by parental disagreement. The social activities of the family play a part, and the economic status, such as poverty, economic stress or wealth. The environment of a small child is a simple one compared with the environmental influences which shape the development of a school child or even an adult. Nevertheless there are many points to take into consideration.

VIII. THE PSYCHOLOGIC BACKGROUND OF THE PERIOD OF RESISTANCE

During the first months of life, the infant's submission, biologically determined by inability to be anything but submissive, is taken for granted by every one concerned. As time goes on he adds to his reactive faculties the meaning and application of consent and negation. He develops a "will" of his own. He learns to express wishes, needs, satisfactions and dissatisfactions through gestures, postures, increasingly complex actions and, finally, words. He lacks, of course, the empiric equipment that would enable him to distinguish between that which is and that which is not useful for him to will and between that which he is and that which he is not expected to will. Thus volition soon comes into conflict with the standards, desires, educational principles and expectations of his environment.

Reactions to discomfort and displeasure are noticed from earliest infancy, even at a time when relative motor helplessness seems to preclude the possibility of any kind of determined revolt. Watson's [19]

19. Watson, I. B.: Psychological Care of Infant and Child, New York, W. W. Norton & Company, Inc., 1928.

experiments have shown that at the age of a few months hampering of a child's movements by holding his head, legs or trunk gently but firmly results in a performance which strongly resembles the expressions and postures indicating anger in adults.

Watson's experiment is interesting, indeed, but it does not concern normal conditions of the infant's life. The average infant's existence is determined by quite other circumstances. There are only a few restrictions for the infant. In former times he took his meals when he wanted and he took as much as he wanted. He cried, and immediately the mother came around to feed him. The mother carried the baby around to comfort him, and she rocked him to sleep. The conditions of the baby's life have changed to some extent since pediatricians decided that parents should not subordinate themselves too much to the child's wishes. The doctor advised that crying during the night was not sufficient reason for picking up the baby and carrying him around for hours. The infant had to learn that *sic volo sic jubeo* is not the correct motto for human beings. His meals were fixed at regular hours of the day, and there were no meals during the night. The quantity of food was restricted. These and other rules (such as the prohibition of the nipple) were made only partly for the purpose of protection of the physical health. They were imposed also because the pediatrician felt that the educational training has to begin with the first day of the child's life and that restrictions may be useful for his further training.

In spite of these regulations, which are carried out not too rigorously, the infant's existence is comfortable. Nobody interferes in his activities. He may soil or wet his crib as he wishes. He may sleep or play. He may cry or laugh. The mother is at his disposition day and night. All people are friendly to him even if he is in a bad humor. The infant might feel that he is the most important and powerful person. He always has "a good time."

This fortunate situation changes completely during the second or third year of the child's life. He learns to walk, to speak, to do some things by himself. Now comes the time for the "new order." The parents begin to raise demands. They are manifold. The child has to stop wetting and soiling his clothes. He must control his bowels and urinary tract not only while he is awake but even during his sleep. He must start to feed and dress or undress himself. He is no more allowed to cry as he wishes. He has to obey the regulations of the daily life of the family, has to take care of things and even to help his mother. He is forbidden to do what is delightful and compelled to do what is unpleasant. Then come the claims of other children, who want their share. The small child in the nursery school has to comply with the regulations of the community. He has no longer the right to use all the toys by himself. There are others who want to play with them.

He is strictly forbidden to take things of other children. The nurse of the nursery school does not care for him alone, but for his playmates also.

The situation may become worse when there are brothers and sisters. If they are older, the infant was at first like a doll who was not a serious competitor. But growing up he may become a rival. If there is a younger child, the attention of the mother turns to the newcomer and he feels deprived of advantages which he enjoyed.

Frustration and more frustration seem to fill the period of early childhood.

It is understandable that the child tries to revolt against the manifold rules imposed on him. He cannot comprehend what it is all about. The most primitive way of rebellion is the temper tantrum, and therefore this reaction is the outstanding feature of the period of resistance. Some children, however, follow other roads. Some turn away from the common mode of establishing social relationship. They prefer to be alone, play exclusively with toys instead of with people and seek pleasure and satisfaction in the narrow sphere of the home and, even more constrictedly, of the self. Another stops his development, turns back to infancy and presents signs of failure to "grow up" and develop independence. There is a tendency to retain privileges accorded to small children.

According to my statistics, lack of social adaptation is the prominent feature of children in the period of resistance. I found it with 96 per cent of the boys and with 88 per cent of the girls. What lack of adaptation means has been discussed previously. One who looked over the histories of the patients included in this study could find everywhere drastic examples of this attitude of the child. Even when one remembers that social adaptation is a long process and that the child during his first years cannot be well adapted to the community, the behavior of these patients proves that there is a striking deficiency.

Every child has some difficulties in adapting himself to the community, and for this reason the period of resistance is a widespread feature of early childhood. With my group of patients, however, there was an exaggeration of the normal picture. There were some traits which are undoubtedly no longer normal, for example, temper tantrums connected by convulsions, some kinds of rocking movement and some forms of speech difficulties. If the period of resistance lasts for years, one has to deal with a pathologic reaction.

It is an important question why a normal feature of the child sometimes becomes aggravated to such an extent that one is entitled to speak of a pathologic development. The answer is not too difficult. First, one has to consider the personality of the child himself from the point of view of his inherent conditions and his constitution. As was explained

before, not much is known about these matters. Secondly, one has to turn to the child's environment.

The more defective the constitutional background of the child happens to be and the more defective the environmental influences are, the greater becomes the danger that the child will be involved in a situation which produces a type of period of resistance such as has been described in the histories reported here.

It should be remembered that most of the children who have such an abnormal period of resistance are only-children or children with one brother or sister. These children have more difficulty in adapting themselves to the community than offspring of a larger family group. The only-child is more exposed to overprotection or overindulgence. The child of a larger family group learns from the beginning of his life that he is not the only person in the world and that he has to share with his siblings.

The children of the group I observed were mostly from those classes of the population who enjoy a higher standard of living. This might be an advantage for the child. On the other hand, however, the children of the well-to-do have difficulties which are unknown among people whose standard of living is lower. Families of economic ease and convenience impose on their children more regulations and restrictions than do people of less comfort.

The children of the well-to-do have generally less freedom and more unpleasant duties even when they are small. They have to be kept exceedingly neat for the visit of the aunt or the grandparents. They are not allowed to run to the garden or the sidewalk by themselves. Sometimes they are kept under constant supervision of a nurse, who takes care of them as a more or less disagreeable duty. Instead of running around they take a walk to the park kept in check by an adult. They have to be silent when visitors come around and when the father is working hard at his desk. They have to learn little tricks or are even taught reading and writing long before school is attended. They learn early the manifold obligations of the social life, politeness toward strangers, clever conversation and the meaning of the social life. The lives of these children are filled, indeed, with duties which would be strange for a child of poor people.

These social classes of the people are in some ways representative of the high civilization of the present time. They enjoy good schooling and culture, are interested in arts, theater, music, books and science and are sometimes prominent in carrying out the social work of the community. The admission to civilization must be bought by great sacrifices. This holds true especially for the child, who has to become a member of the civilized world within the short time of about two years. The development of the child, however, repeats within a short

space of time the development of the human race as a whole. Ontogenesis is a recapitulation of phylogenesis. There are good reasons to believe that the psychology of the first period of the child's life resembles very much the psychology of primitive people. From this level the child has to climb to the high level of civilization. The child is really a "wanderer between two worlds."

Many children are unsuccessful in this struggle and are drawn into the whirlpool of pathologic reactions. It is worth while to note that primitive people degenerate or become victims of infectious diseases or of alcohol when the benedictions of civilization have been forced on them.

APPENDIX: THE DISEASE OF CIVILIZATION [20]

The following remarks pass beyond the boundaries of medicine. They demonstrate, however, how closely the problem of the child's training is related to other problems of the social life of the community.

The rise to civilization is dangerous not only for the child but for nations who reach this high level.

After the time of nomadic life there came a period characterized by the small hamlet, by defense against beasts or other enemies and by lack of knowledge and lack of need for it. From this state there developed the city, with its Gothic cathedrals. This was the time of the discovery of the art of printing and of the translation of the bible by Luther. Finally there arose the civilization which has for representatives the metropolis, skyscraper, telephone, radio, steam engine, automobile and airplane. With all nations of the past the road has been in principle the same, although there are naturally important differences based on the era and on racial, geographic and other conditions.[21]

When a height of civilization has been reached some social phenomena become evident which seem to repeat themselves whenever nations enter a state of high civilization. It will be seen that the present time is ridden with this disease. Its symptoms are today very obvious.

One could study this problem with the history of the empire of the Pharaohs or with the history of Greece. It seemed, however, easier to use the literature of the old Roman empire, which has been handed down to posterity so well.

When from the simplicity of the republic Rome developed into an empire, when world traffic and world commerce were flourishing and the new ideas of Greek education began to spread, the educational problem became of prime importance.

Old Roman education lay above all in the hands of the father and the mother. According to the customs of the forefathers the child was educated for the purpose of becoming an efficient member of the community.

Virtus, not *scientia* was the aim. Instruction was restricted to reading, writing and elementary arithmetic. Discipline at home and at school was strict. To become a pupil was termed "to come under the rod."

The decay of the family at the end of the Republic injured the domestic training. The many-sided interests of women (one could call it an emancipation) let them forget their duties toward their children. The youngsters were entrusted to the

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20. Benjamin, E.: Die Krankheit der Zivilisation, Munich, R. Mueller u. Steinicke, 1934.

21. Spengler, O.: The Decline of the West, New York, Alfred A. Knopf, 1929.

care of Greek nurses. Plutarch (Consolatio ad uxarem) wrote to his wife: "There are many mothers who take their children on their arms like dolls only if they have been cleaned up and dressed by other persons."

At the same time new tendencies penetrated education. Tolerance and indulgence toward the child, respect for his personality, became its principles: "Instruction should be a pleasure; the child should be praised, encouraged and everything should be arranged so that the child loves what he is doing" (Quintilian, Institutionis oratoriae I, 1, 20). The program of the school work began to enlarge and the problem of overburdening began to play a part (Pseudo-Plutarch, de lib. ed. chapter 12).

The doctrine of the only-child was founded by Seneca. (De ira, II, 21): "Thus the mind of only-sons is the more spoiled the more one indulges them and the more they are allowed to do. He would not know how to stand bad luck if he were never refused anything, if the careful mother always wiped away his tears and if he always was protected against his teachers."

Quintilian (Institutionis oratoriae I, 3, 3) described those premature talents the smartness of which hides their lack of inner force but which will disappoint later on.

Impressive are the famous sentences by which Tacitus (Dialogus de orataribus, chapters 28 and 29) compared the education of the old Roman people with that of his own era: "Even the fathers do not accustom their children to modesty and order but to fresh and pert behavior wherefrom impudence and disrespect of themselves gradually arise. Let us add the foolishness of our city, which I have to consider as almost planted into the still unborn child: the predilection for actors, the passion for gladiatorial games and horse races. When the mind is occupied and obsessed by these things, how much time will there remain for the good? Where are people to be found who talk about other matters?"

The importance of the educational problem in the literature of this era can be understood only by looking at the totality of cultural conditions. I shall not discuss the whole problem, and so I am going to restrict myself to the enumeration of a few characteristic quotations of writers of that time.

Juvenal expressed surprise that no temples and altars had been dedicated to the sacred power of richness.

One of Martial's wishes was to find a wife who was not too much educated, and Juvenal (Satirae VI, verses 448 to 451) sneered at the ladies who during meals criticized the poets and did not give anybody else a chance to talk: "The woman whom you are going to marry need not have experience in all tricks of rhetoric nor need she correct all your grammatical mistakes as a learned linguist, but it is better if she does not understand everything in your books either."

In another satire the same writer described the sporting activities of the women adorned with the plume of helmet, the lance and the fencing gloves.

Suicide had become a matter of fashion: "Therefore the wise man lives as long as he wants, not as long as he can," said Seneca (Ad Lucilium epistolae moralis 70, § 13).

In 220 A. D. there were brought forth 3,000 processes concerning divorce. "Why should a woman blush because of divorce, since noble ladies don't count the number of years any longer according to the number of consuls but according to the number of their husbands?" [22]

22. Cited by Friedländer, L.: Darstellungenaus der Sittengeschichte Roms in der Zeit von August bis zum Ausgang der Antonine, ed. 8, Leipzig, S. Hirzel, 1910, vol. 1, p. 426.

Augustus had already tried in vain to take action against the decline of births through the lex Papia Poppaea. According to Plinius, barren marriages were praised aloud.

Ovid devoted two of his elegies (XIII and XIV) to artificial interruptions of pregnancies:

In amicam, quod abortivum ipsa fecerit [23]

What helpes it Woman to be free from warre?
Nor being arm'd fierce troupes to follow farre,
If without battell selfe-wrought wounds annoy them,
And their owne priuie weapon'd hands destroy them?

Who vnborne infants first to slay inuented
Deseru'd thereby with death to be tormented.
Because thy belly should rough wrinckles lacke,
Wilt thou thy wombe-inclosed off-spring wracke?
Had ancient Mothers this vile custome cherisht,
All humaine kinde by their default had perisht. . . .

Why with his irons are your bowels torne?
And why dire poison giue you babes vnborne? . . .

Armenian tygers neuer did so ill,
Nor dares the Lyonesse her young whelpes kill.
But tender Damsels do it, though with paine,
Oft dyes she that her paunch-wrapt child hath slaine
Shee dyes, and with loose haires to graue is sent,
And who ere see her, worthily lament.

These few quotations may serve as a warning not only to Europe but also to America. At the time Seneca, Tacitus, Juvenal and Plinius lived, the breakdown of the Roman Empire was not so far distant! In an address to the association of pediatricians at Dresden (Germany) eight years ago I mentioned my studies of the decline of the West and finished my paper by the hopeful sentence: "It is not yet too late!" Today I should like to say: "It *is* too late—at least for Europe!"

IX. THERAPY

The histories of children admitted to the Children's Home show that the success of change of environment has usually been satisfactory even for patients whose manifestations were severe. What is the cause of these successes?

When children of this type are observed in the new environment, several forms of behavior are encountered. Most surprising are subjects who immediately cease temper tantrums and other manifestations and who behave later as normal children do. With other children, however, a favorable result can be achieved only in days or even weeks. With a third group, the difficulties continue for a long time and it is not possible to change the child's attitude completely, although there

23. Translated by Christopher Marlowe, in The Works of Christopher Marlowe, edited by C. F. Tucker Brooke, New York, Oxford University Press, 1929.

is always a remarkable improvement. I suppose that with the third group the hereditary conditions may play a major part, while with the other groups the environmental influences seem decisive.

Even when the observer knows the patients well and lives with them for twenty-four hours a day, he is not really able to comprehend the child's personality. Therefore, a study of the cause of the efficiency of change of environment must be based on conjectures more than on facts. It seems evident that the change of the child's attitude is intimately connected with his social adaptation. Children are frequently suspicious when they arrive at a children's home. They have no confidence in anybody and sometimes rebel against the new environment just as they did against the old one at home. Occasionally the rebellion assumes new forms. Feeding difficulties disappear, for example, and the child begins to wet his clothes or his bed. Many children behave in the new environment as if they missed the joy of life. They look sad or depressed and are not interested in the happy life of the small community. When the children's home is directed in a good and reasonable manner the child feels sooner or later that he is a member of the group, with the same rights other children enjoy. He becomes aware that the life of this group is happy and that discipline is not by compulsion but by voluntary subordination to laws accepted by the community. The other children help to strengthen the confidence of the child. They play with him and treat him as an equally privileged fellow. Important is the opportunity to do things by himself as well as the lack of nagging when the child does not eat enough or when he wets himself.

In this way the self confidence of the patient increases. His distrust disappears gradually, his resistance recedes and his difficulties become less accentuated. The period of resistance is a phenomenon based on the child's social relations, and the result of our therapy proves that this assumption is correct.

When children of this type have to be treated in the family group, something may be learned from the experiences at the home. The therapy used there has the goal of helping the child to become a member of the group. This means that the physician is trying to gain an influence on the educational methods of the parents. The watchword "education of the educators" becomes the motto of the work.

I do not present a fixed method for this purpose. Every physician has to proceed according to his nature and capacity. One doctor will succeed by using his authority. Another will succeed through the kindness of his personality. A third achieves good results by his power of persuasion. In vain, however, will be the effort of a man who learned a special method without having the faculty of using it correctly. In vain also will be the work of some one who does not act with holy zeal and who does not wish to help the patient with all his heart.

The task of parental education calls for tactfulness, patience, willingness to listen, ability to size up situations, satisfaction with gradual progress and real understanding of human behavior and its deviations. Parental anxieties and perplexities must be recognized, given opportunities for ventilation and removed as much as possible. Only thus can one be assured that recommendations concerning specific disturbances of infantile conduct will not be regarded as isolated prescriptions, everything else to be left unchanged. Erroneous notions regarding health and child rearing must be corrected, so that they may not continue to disturb the parent-child relations. It must be realized that the resistive child himself acts as he does not because of some inherent devilishness but as an inexperienced, floundering, groping, insecure being who has not hitherto been helped to socialize satisfactorily.

The task of helping the parents is frequently difficult because one has to deal with personalities who suffer themselves from more or less severe personality disorders. They are usually well meaning and willing to help the child. But their own difficulties are an obstacle which cannot be surmounted satisfactorily. Ideally it should be the physician's task to change the personality of the father or the mother or even both. I do not believe that a doctor can do this. What he can do is to try to change some attitudes of the parents toward the child.

Helpful treatment can proceed only on the basis of familiarity with the child and with the circumstances under which the resistive behavior has shaped itself. I have seen time and again the uselessness of haphazard short circuit methods of screaming and beating employed by parents or nurses, and the equal inefficiency of tonics, appetizers, sedatives and cathartics sometimes prescribed by physicians. Such devices fail to reach the real issues involved and leave the essential, spite-breeding conditions exactly where they were. An "appetizer," instead of doing away with the distressing aversion, adds to the problem when it comes to the administration of the drug. There is just one more battle to be fought every time the child is to ingest the teaspoonful of medicine. By the time the battle is won by the parents, everybody is so exhausted by the fight that there is not enough vigor left to proceed with the meal. Besides, the child always has a chance to expel through vomiting the medicine that has been forced down with so much effort. This holds true in the case of any other medication. The typical sequence, leading from fruit juices, laxatives and suppositories to enemas, is a well known example of the progression to ever more drastic measures. The daily enema is seized on by the resistive child as a not at all unwelcome, yet violently fought, opportunity for further domination of the family and at the same time is apt to upset artificially the normal intestinal routine of the child. Beating as a means of obtaining obedience is always a sign of poor educational resourcefulness. Beating, furthermore, is

usually followed by parental regret and apologies to the beaten child, who in the end gets what he wanted in the beginning. "It hurts me more than it hurts you" is what the child is told eventually, and the beating which gives him so much attention is anything but a deterrent.

The first therapeutic step is, then, logically the discouragement of any such aggravating instead of remedying procedures. The mother must learn to give up or, if this cannot be accomplished, to conceal the concern over the child's eating, elimination, sleep and complaints of aches and pains, after she has satisfied herself through examination by a competent physician that no organic illness is responsible for the difficulty.

No food is to be allowed between meals, which are to be given calmly at regular intervals, with no comments. The dishes are to be removed just as calmly after a reasonable time, regardless of the amounts consumed. It should be explained to the parents that there is no danger if a child misses one meal or two meals or even several meals, but that there is considerable unpleasantness ahead for a child who is constantly coaxed, forced, bribed, cajoled and threatened. The mother should be convinced that she does not "have to" resort to this or that trick in order to "make" her offspring eat. Sometimes the child's own resistive attitude has been used helpfully in the treatment of his food capriciousness. He is given at regular mealtime minimal quantities of the things which he likes best and equally small amounts of other foods. If he begins to ask for more of anything, the battle is often half won. He is then given another minimal portion. When he gets into the habit of asking for more, his favorite dishes are slowly supplemented by other things which he has previously refused. He should not be allowed to notice the intention underlying this procedure, or he may immediately use it for his own purpose and revert to his former mode of behavior. The main goal is to have him derive as much pleasure from refusing to be satisfied with such small amounts as he has derived before from refusing to accept food.

Capriciousness in defecation is dealt with in a similarly calm manner. The mother has done her duty when she has given the child an opportunity to evacuate at regular, not too frequent not too rare, intervals. It is not necessary that she witness, supervise and direct the whole procedure. The child might be allowed some privacy in the matter. It hardly merits the sacerdotal solemnity with which some mothers concern themselves about every fecal expulsion of their children.

In these matters, and more especially in the management of temper tantrums, avoidance of alarm is one of the most essential requirements. The parents should know that no child has ever become sick or died of a tantrum. No danger is involved in the practice of waiting quietly until the storm is over. The habit of "giving in" should by all means

be discouraged. Parental compliance is the surest way of maintaining the temper tantrums in a child. A youngster of any age and any degree of intelligence will soon learn to give up his rages if he has been sufficiently impressed with their futility as a means of obtaining his wishes or gaining attention. To react to tantrums with similar emotional outbursts is a bad mistake. "Yelling" at the child, beating or any kind of agitation should be warned against. One should also explain to the parents that "reasoning" or "pleading" with a child during a tantrum is an unwise move. No one in the midst of a major emotional upheaval is accessible to logical arguments or sermons.

Finally I wish to stress one point which seems to be of considerable practical importance. Many parents are proud of the cleverness of their child, and unconsciously or consciously they stimulate his intelligence. They teach the infant little tricks, show him off to visitors, play with him all day long. He is allowed to attend the movies or the circus or has to learn reading and writing long before he attends school. In this way the intelligence of the child is pushed in an unreasonable manner. It is probably possible to raise the child's intelligence quotient, but overstimulating him mentally may lead to a disharmony of the personality which involves difficulties for the child. It is not the task to develop "geniuses"!

The child's socialization can often be greatly improved with the aid of a nursery school. The parents and the child can thus be given a vacation from each other for a few hours every day. The routine performances can be divested of the attending histrionics where they produce no results and where other children go calmly about those functions. The mothers can learn from the teachers how to manage their children at home.

When parental cooperation cannot be obtained with the child at home, when redirection can best be accomplished with the child separately and the parents separately, then—and only then—temporary removal of the child to a foster, convalescent or child-training home offers itself as a constructive measure. In this manner distance is gained from an established pattern of living, which could not otherwise be disestablished. The parents have a chance to work out their own problem in the absence of one of the principal feeders of problems. The child can be retrained. Both "parties" are given a possibility for a face-saving readjustment to each other, in which neither is exposed to the task of capitulating. When both the parents and the child have become sufficiently attuned to a healthier, happier, calmer existence, when enough of former nonconformity, agitation and anxiety has evanesced, then is the time for them to get together again and start over with better habits, insight and mutuality, if necessary with the help of a good social worker.

X. PREVENTION

Besides the therapy of the individual patient, attention must be turned to the problem of prevention. If the manifestations of the period of resistance were always transient, one should not have to care too much about them. In many cases this period of life is really nothing but a short episode in the child's existence. Unfortunately it is not possible to predict the future. Frequently one observes that the period of resistance represents the beginning of an unpleasant development. My follow-up study, as well as my former experiences, shows that more than 80 per cent of all children of this type had considerable difficulties from four to eight years after their first visit to the clinic. This figure demonstrates clearly the significance of the period of resistance for children's development.

It is known that only-children or children with one brother or sister are especially in danger. As in many of the countries of Europe, there is also in the United States of America a decline of births. Therefore, in the course of time the pathologic type of the period of resistance will become more frequent. Since physicians are now cognizant of the dangers besetting the child, they no longer have the right to remain idle. It is not at all an exaggeration to say that a nation which does not care about this problem is in danger. The historical parallels that I have presented demonstrate that child training is intimately related to other symptoms of "decadence" and to the destiny of the country.

This is a question of public welfare. It is the physicians' duty to discover suitable methods of prevention.

As has been demonstrated, infantile resistance unchecked and allowed to gather momentum can lead to disagreeable consequences, upsetting the family peace and playing havoc with the child's personality development. The capriciousness in eating and defecation may eventually be discarded as specific manifestations of remonstrance. The matter is not merely one of temper tantrums. They may subside. Other "symptoms" may clear up. Yet the child himself, who has for years refused to conform, failed to socialize, lived in spiteful tyranny, cannot overnight become amiable, sociable, courteous and unselfish. At a somewhat later age, during the school period, the complaints are changed to those of unfriendliness, sullenness, inconsiderateness and unpopularity with other children because of bossiness, bullying and fighting. A study of my follow-up cases has shown that most of the patients, in spite of good intelligence, have had difficulties with their scholastic progress, an unevenness and jerkiness of performance and conduct in the classroom. Of course, there are some children who have enough inherent stability to emerge from a point of stubborn resistiveness with the help of the outside influences of the school, religious instruction and recreational groups, such as the Y.M.C.A., Y.W.C.A., Boy Scouts and Girl Scouts.

But in the main, the fundamental character traits may already have been formed by that time. The period of greatest pliability has been missed. Retraining must take the place of training.

Is it not, therefore, possible or desirable to apply the educational lever at an age when the resistance has not yet become unwholesome and problematic? Cannot, and should not, the resistive antics and all that goes with them be prevented?

It is not necessary to wait until things have gone wrong. The best results are to be expected from the education of prospective parents and those who have small children. Much will be gained if parents can be guided into and through the children's so-called period of resistance in a manner that would avoid anxieties, bafflements, agitations, hostilities, autocracy, overindulgence and neglect. Much will be gained if parents can be prepared for their children's early negations and refusals as something to be looked forward to as signs of normal and healthy development, as useful functions of the growing child which if properly directed contain the nucleus for sound criticism, competition, fair play and the preservation of self dependence and self respect. Such an attitude would help to remove the odium of disobedience and contrariness and emphasize the constructive socializing value of self assertion as a truly democratic principle.

Much will be gained if the parents learn that a child needs the same good-natured aid and encouragement in finding his place securely in the family group as he needs in his first attempts at walking or climbing on a chair. Allowance must be made for a trial and error period, during which advice should be administered instead of punishment. The advice should not take the futile form of "lecturing," which conveys little real meaning to the child, but should help him through difficult situations.

The establishment of contest and controversy is best precluded by offering suggestions, closely corresponding alternatives and inducements instead of unrelentingly rigid demands that leave no room for possible compromise. Many a seemingly serious issue can easily be converted into playful cooperation with some degree of humorous inventiveness. No harm is done if a child's petty and irrelevant "No, no!" and "I won't" replies are disregarded, when at the same time matters pertaining to daily routine, habit regularity and gradual emancipation are insisted on with gentle firmness. His right to resist unreasonable demands should be acknowledged. He should be allowed to continue with the game in which he is absorbed, even though grandmother is just then anxious to show him off to visiting Mrs. Jones. And he should receive the same courtesy to which all other members of the family are entitled.

Advice of this kind will be helpful for prevention of future difficulties, but it does not concern the main issue. What is this main issue? I think that any one can sense what I am about to say. Many

of these children are suffering from the lack of mother's love, which is the foundation of a child's undisturbed and harmonious development. A mother's love cannot be tested by scientific methods such as the famous intelligence tests; nevertheless it is there and represents the mysterious background of the child's development. One is entitled to ask if this knowledge is useful for the child and if one can help him by knowing something about the importance of mother's love. I answer that the pediatrician and the child psychiatrist must teach the mother day by day that it is not the care of the body which is the main thing for the small child but rather the unselfish love and protection of a mother. The whole picture of the psychopathology of childhood and especially the psychopathology of early childhood should have one big headline: The child who misses mother's love is in danger.

The problem of prevention concerns not the child psychiatrist alone but also the public health officer. Child psychiatrists should point over and over again to the importance of the child's early development for his social adaptation and mental hygiene. But it is up to the public health service to work out practical methods of prevention. In a rather short time pediatricians have been able to abolish many deep-rooted mistakes connected with the physical care of the child. Why should child psychiatrists not be able to change some attitudes of parents concerning educational training?

I am not able to present a detailed program for this purpose. The following suggestions are simply an outline for further elaboration by the public health service.

Every organization which has to deal with infants or small children should bear in mind that the care of the physical health of the child is only a part of its duties. The care of the child's mental hygiene is of the same significance. All of these organizations call for expert supervision by persons who are experienced in educational problems. This applies to well baby clinics, nursery schools, kindergartens and children's hospitals. It is especially important for orphanages and charitable institutions which keep children for twenty-four hours a day. It is known that small children living in such institutions for a long time are in danger. Sometimes speech does not develop correctly; sometimes acquisition of cleanliness is delayed or social adaptation does not proceed regularly.

There must be some kind of collaboration with the public schools. Children who present difficulties in early childhood should be followed up during their years in school. This can be done by means of reports which accompany the child from nursery school to kindergarten and public school and which give an account of his psychic difficulties.

The work of the child psychiatrist is in need of collaboration of the general practitioner, who must be prepared to meet this task. It seems

to me that working in this field is no less important than is prevention of infectious diseases. Nowadays, however, the general practitioner has neither the desire nor the training to occupy himself with the quarrels of parents of problem children. It is the duty of the universities to give students the knowledge which is indispensable for this kind of work. One should remember, however, that lectures and theoretic discussions are not at all sufficient for the training of the physician, especially for one who wishes to specialize in this field. For him it is necessary to live with the little patients day and night, at least for some time. He must know many things which cannot be told by the mother. He must study personality and not merely by description the behavior of the problem children in a group and when left alone. He must study their play activities, their dependence or independence, their methods of feeding, modes of dressing and undressing, their habits of sleep and so forth. The method which I find best is admittedly a very inconvenient one, but other more convenient methods do not lead to a real understanding of the child. He who would avoid these inconveniences had better work in another field of medicine. It is in no way a disgrace for a physician to work for a time as an educator or even as a nurse.

Important too is the training of nurses, kindergarten teachers and social workers. Many of them are not well prepared for the psychic care of the infant or the small child. It is not desirable to teach these persons a great deal of psychology or psychopathology, but they should learn that the infant and the small child need motherliness and that no one should devote himself to this kind of work if he is not able to give the child parent-like love.

There are only a few institutions which are managed on a scientific basis and are available for twenty-four hour observation. It is necessary that new institutions of this kind be created. The results obtained from these institutions will be useful for the study of problem children, and here there will be worked out the most efficient methods of training people for the guidance of small children.

Schools for mothers would be splendid.

The spread of nursery schools and kindergartens has proved to be of considerable help to children. The child finds there companionship, the possibility for the development of a spirit of give and take through play or mere enjoyment of living.

The foundation of an institution intended mainly for research work is desirable. There are similar institutions for the study of mental diseases, but the problem under consideration here is much more hopeful and promising.

The propaganda of the idea of "prophylactic education" must be based mainly on advice given in the physician's office. Expositions of

mental hygiene of the child, however, and lectures, radio talks or moving pictures may also be useful.

The propaganda of the idea of "prophylactic education" must be based before it is ready for practical use. One should remember, however, that this is a most important question of public health. Time must not be wasted. It is the task of the physician to do the best he can to help the child and his parents.

Real democracy does not begin at the age of 21 years. Real democracy begins at the beginning, when neither parental nor infantile despotism should be allowed to govern the social unit which is the home. Disturbing rebellion, which is still so frequent in children and which I have described in detail, has no opportunity to flourish in an atmosphere of good sportsmanship, reasonable compromise, reciprocity and mutuality.

Unwholesome remonstrance can be prevented. Such an attitude is over and above the safest guarantee for the rearing of self-dependent, conforming, considerate, truly free and democratic Americans.

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RESPIRATION OF PREMATURE INFANTS

RESPONSE TO VARIATIONS OF OXYGEN AND TO INCREASED CARBON DIOXIDE IN INSPIRED AIR

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DETROIT

It has long been recognized that records of the breathing of prematurely born infants demonstrate gross irregularities in rate and in amplitude, as well as in the points of maximum inspiration and expiration. This has been generally and rather vaguely accepted as due to immaturity of the respiratory centers of these infants, a phenomenon considered as not necessarily due to oxygen lack, although quite possibly causing it. The question has frequently arisen as to how consistently the respiratory centers of these immature babies respond to the usual stimuli of carbon dioxide excess or oxygen lack, and clinicians have long been undecided as to the value of excess-oxygen therapy, especially when obvious cyanosis is not present. To attempt to get some further light on these problems, a series of premature babies, 33 in number, were studied.

PROCEDURE

For the test the infant was placed in a body plethysmograph, the head projecting outside the plethysmograph through a rubber collar, nicely adjusted around the neck to be air tight.[1] A hood of cellophane was arranged around the head so that various gas mixtures could be administered. A record of the change in volume of the baby's body during respiration was made by a small, delicately balanced Krogh spirometer connected directly with the plethysmograph chamber and recording on the usual kymograph. In this study no attempt was made to quantitate the volume of respiratory changes. With any one baby the record of respiration showed changes which were comparable, but since there was a variable lag in the system depending on the size of the baby, motion of the spirometer did not record the respiratory volume changes of different babies on the same scale. No attempt was made to administer very accurately measured gas mixtures.

Observations were made of babies when breathing air and when breathing in an atmosphere with a total oxygen content between 12 and 15 per cent, in an

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1. Shaw, L. A., and Hopkins, F. R.: The Respiration of Premature Infants, Am. J. Dis. Child. **42**:335 (Aug.) 1931.

atmosphere with a high oxygen content, between 70 and 90 per cent, and in an atmosphere of approximately 70 per cent oxygen and 7 per cent carbon dioxide.

As in other similar studies, getting a good record presented considerable technical difficulties. The baby was placed in the apparatus after he had been fed, in the hope that he would sleep throughout the experiment. Small motions of the body were transmitted to a variable extent to the rubber diaphragm or collar, thus producing changes confusing the record of the respiratory activity. Any crying

Data on Individual Infants Studied

Infants	Age, Days	Weight		Periodic Breathing Due to Low Oxygen Content (12 per Cent)	Periodic Breathing in Air	Regular Breathing in High Oxygen Atmosphere Following Periodic Breathing in Air	Response to CO_2 by Hyperpnea
		Lb.	Oz.				
1	60	3	7	+	+	0	++
2	18	2	14	+	0	..	+++
3	45	3	10½	?	+	++	++
4	30	3	2	?	..	+	+
5	16	4	10½	+	+	0	+
6	16	4	10	..	+	++	..
7	8	3	14	+	0	+	..
8	3	4	2	..	+	0	++
9	70	4	2	..	+	+	..
10	9	3	14	+	+	+	..
11	4	4	6	0	+	+	..
12	40	3	3	+	+	+++	++
13	15	3	11	+	+	..	+++
14	18	..	..	+	?	..	+++
15	37	3	12	0	+	+	+++
16	13	3	6	+	0	?	+
17	12	3	6	..	+	+	+
18	9	3	12	?	?	?	..
19	43	3	14	+	+	+	+++
20	4	3	15	0	0	..	+++
21	8	3	0	+	+	..	..
22	23	3	5	+	+	+	++
23	33	4	6	..	+	+	+
24	31	4	0	..	0	+	..
25	13	3	7	..	+	++	..
26	17	3	8	..	+	++	..
27	1	3	6	..	+	+	+
28	7	3	0	..	+	+	++
29	14	3	1½	..	+	++	..
30	1	3	8	..	+	+	+
31	8½	3	8	..	+	++	..
32	2	3	3	..	+	+	++
33	3	4	1½	..	+	+	..

caused obvious difficulties. The fit of the rubber collar needs to be exact, to avoid uncomfortable or dangerous pressure and yet still make an air-tight connection.

Thirty-three babies were studied, all of them "healthy" as far as premature infants may be so called and without evidence of congenital anomalies or infections. The babies studied varied in weight between 2 pounds 14 ounces (1,304 Gm.) and 4 pounds 6 ounces (1,984 Gm.), as shown in the accompanying table. Their ages varied from one to seventy days. The first 20 babies only were given carbon dioxide to breathe, since they all showed fairly consistent results and since the procedure was obviously disagreeable to many. Only 18 of the babies were observed while breathing the low oxygen atmosphere. Although all these babies were "healthy," this low oxygen atmosphere was not given without some concern, and not at all to the more immature-appearing babies. Small sections only of some typical records are shown.

RESULTS

Breathing in Air.—Thirty-three observations were made of babies breathing air. All of them breathed for a large part of the time with the grossly irregular respirations previously described. The first part of the tracing in figure 1 *A* is typical. It is evident that the respiration is irregular in rate and amplitude as well as at the end points of expiration, as demonstrated by the irregular base line.

At one time or another, 25 of the 33 infants produced a curve with a distinct periodic pattern of respiration. The last part of figure 1 *A* shows an example which is similar to all the others. This is a type of respiration typical of "Cheyne-Stokes" breathing, although it does not differ a great deal from the periodic breathing with shorter cycles seen

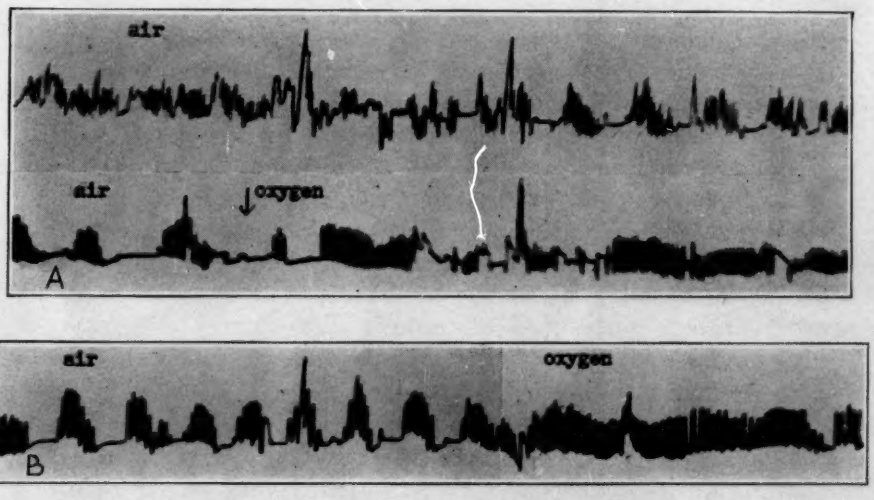

Fig. 1.—*A* shows the common grossly irregular breathing at first, gradually changing to a distinctly periodic type, which on the administration of oxygen becomes more regular. *B* shows a typical kind of periodic breathing in air, followed by somewhat deeper but more regular breathing on the administration of oxygen.

in mountain sickness. In some of the babies this type of breathing was evident during most of the time when they were asleep. In others, during part of the time this pattern was less clearly seen, and it was evident that it was superimposed on and disturbed by gross irregularities.

Breathing of Carbon Dioxide.—Twenty babies were observed while breathing in an atmosphere of high carbon dioxide content. With no exception, all showed quite promptly a definite and marked hyperpnea, as illustrated in figure 2 *B*. No evidence of an inability to respond to the stimulus was seen. However, it should be clearly noted that the stimulus that we gave might be considered maximum and that variation

in response might have existed with smaller doses of carbon dioxide more nicely regulated. As pointed out before, no sick or very feeble infants were included.

Breathing in Atmosphere of Low Oxygen Content.—Eighteen of the babies were observed while breathing the low oxygen atmosphere. These were as a whole the best specimens and the more vigorous infants. In 2 of the 18 there was a response with a moderate hyperpnea.

In 12 there appeared after short intervals very distinctly periodic breathing. Though this periodic breathing varied somewhat from baby to baby, it consisted of a period of regular respiration following a period of complete apnea and did not essentially differ from the periodic breathing observed in the babies breathing in air, shown in figure 1 (*A* and *B*). In a few instances apnea followed successive periods of only four or five deep inspirations, a rhythm generally considered more typical of pure anoxia breathing than of the "Cheyne-Stokes" (fig. 2 *A*).

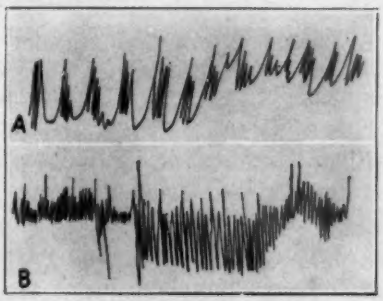

Fig. 2.—*A*, respiratory curve of infant breathing an atmosphere containing 12 per cent oxygen. *B*, response to administration of carbon dioxide. These curves were manually copied owing to difficulties in photography.

In 3 babies, although a definite tendency toward irregular breathing could be observed, it was not clearcut nor surely to be distinguished from the grossly irregular breathing that all the babies showed at times.

Breathing in Atmosphere of High Oxygen Content.—Twenty-eight of the babies were observed while in an atmosphere containing 70 per cent oxygen or more. For 23 of these infants administration of oxygen was begun during the period of air breathing at a time when the periodic breathing described before was definitely apparent. These infants demonstrated a fairly prompt cessation of the periodic breathing and a change to relatively regular and often somewhat deeper breathing. Figure 1 shows typical illustrations of this, which do not essentially differ from many others. This response to the administration of oxygen under these circumstances was very consistent.

Relation of Respiratory Response to Age and Weight.—Rather to our surprise, we were unable to detect in the short series of babies that we have studied any relation between the type of response to the administration of these different gas mixtures and either age or weight. We are of course not at all sure that a longer series would not show some statistical evidence of greater "immaturity" of response in the younger and smaller infants.

COMMENT

It is to be recalled that none of these babies were considered to be dangerously feeble infants. The response to atmospheres low in oxygen and to atmospheres high in carbon dioxide was so consistent as to convince us that the premature infants studied acted as do older children. It is certainly quite possible that the response to the administration of a low oxygen atmosphere to very feeble infants might be that of cessation of respiration.

The periodic breathing that many of these babies showed in normal air or demonstrated when breathing in an atmosphere low in oxygen is characteristic of the so-called Cheyne-Stokes breathing seen in adults with disease, or experimentally produced by shallow breathing. In our babies the periods of the different phases of respiratory activity were usually rather longer than those described in altitude sickness, although we do not think the difference necessarily significant.

Apparently periodic breathing is best explained by lack of effective hydrogen ion stimulus to the medullary respiratory centers, which allows the stimulus of a low oxygen atmosphere to act on the carotid sinus. The stimulus of such an atmosphere produces an intermittent respiration because the supply of the arterial oxygen is quickly depleted or replenished by small variations in respiration. An effective hydrogen ion stimulus may be lacking either because of a deficiency of the hydrogen ion itself or because of the raising of the "threshold" to stimulus of the medullary centers. A diminished oxygen supply may itself raise the threshold of the medullary centers to the hydrogen ion stimulus.

We do not believe that the significance of such periodic breathing can always be clearly established. The phenomenon can be brought about in certain susceptible persons by enforced shallow breathing, by breathing in an atmosphere low in oxygen, by breathing through a long tube, which increases the physiologic dead air space of the lungs, or by a period of voluntary hyperpnea.

The very frequent occurrence of a periodic type of respiration in these presumably healthy premature babies is of considerable interest. The fact that any effect on breathing could be produced by the administration of a high oxygen atmosphere demonstrates, of course, that the average amount of alveolar oxygen had not been sufficiently

high to keep the arterial hemoglobin at its usual state of near saturation with oxygen. This can be definitely stated from our knowledge of the oxygen saturation curve of hemoglobin, which indicates that arterial hemoglobin is nearly saturated with oxygen by the partial pressure of oxygen maintained in the alveoli during ordinary and normal respiration. Excessive oxygen administered during normal respiration should have no effect, since the hemoglobin is already carrying all the oxygen possible. Any effect from the administration of oxygen, therefore, establishes that the preceding alveoli oxygen content has not been normal or that abnormal conditions of gas diffusion in the lungs exist.

It seems to us that it cannot definitely be stated whether the demonstrated corrective effect of oxygen on the periodic breathing of these premature infants indicates a primary defect in the nerve centers controlling respiration which has led to inadequate pulmonary ventilation or a primary defect in pulmonary gas exchange between the alveoli and the blood. Study of the structure of the lungs of premature infants shows that the average distance between air sac and blood vessel is greater than that in normal infants, and a persistence of the fetal state of the lungs might well explain a greater barrier to the transfer of oxygen from air to blood than exists in more mature babies. Without alveolar and arterial gas studies, conclusions on this point cannot be reached.

We have no proof that the regular type of respiration, which we are accustomed to consider "normal," is "better" for a premature infant than the periodic type of breathing described. Likewise, we have no convincing evidence that an increased oxygen content of arterial blood is beneficial or necessarily of importance. It is evident, however, that these healthy premature infants breathed in a more normal manner in an oxygen-enriched atmosphere.

SUMMARY

A series of 30 healthy premature infants varying in weight from 2 pounds 14 ounces (1,304 Gm.) to 4 pounds 10 ounces (1,984 Gm.) showed a respiratory response to atmospheres of low oxygen and of high carbon dioxide similar to that expected of more mature infants. Twenty-three of twenty-eight of these infants demonstrated while breathing air a rhythmic periodic type of respiration which became quite regular on administration of oxygen.

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RESPIRATORY METABOLISM IN INFANCY AND IN CHILDHOOD

XXVI. A CALORIMETER FOR MEASURING THE HEAT LOSS OF PREMATURE INFANTS

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Although the temperature regulation of adults has been carefully studied, no comprehensive simultaneous measurements of heat production and heat loss have been made for premature infants. Since one evidence of the functional immaturity of premature infants is their inability to prevent large fluctuations in body temperature, it should be both interesting and important to measure accurately the various factors involved in temperature control. What, if any, is the part played on the one hand by structural peculiarities such as large surface area and thin subcutaneous fat, and on the other by physiologic inadequacies of circulation, sweating or nervous regulatory control? In studying this subject the first problem was the accurate measurement of heat loss, and for this purpose it became necessary to construct a direct calorimeter. Because this calorimeter differs from other previously reported direct calorimeters, is simple and cheap to construct, and is accurate and easy to operate, its description merits publication. The results obtained with its use will be the subject of a separate communication.

PURPOSE OF THE CALORIMETER

Hardy and Soderstrom,[1] Winslow, Herrington and Gagge,[2] Burton [3] and others have shown the utility of measurements of heat loss in studies of temperature regulation. Of particular importance is a knowledge of

From the Department of Pediatrics, Cornell University Medical College, and the Russell Sage Institute of Pathology, New York Hospital. Assistance in this work was given by the Children's Bureau, United States Department of Labor.

1. Hardy, J. D., and Soderstrom, G. F.: Heat Loss from the Nude Body and Peripheral Blood Flow at Temperatures of 22° C.-35° C., J. Nutrition **16**:493 (Nov.) 1938.

2. Winslow, C.-E. A.; Herrington, L. P., and Gagge, A. P.: Physiological Reactions of the Human Body to Varying Environmental Temperatures, Am. J. Physiol. **120**:1 (Sept.) 1937.

3. Burton, A. C.: The Application of the Theory of Heat Flow to the Study of Energy Metabolism, J. Nutrition **7**:497 (May) 1934.

the so-called "thermal conductance" which provides not only a quantitative measure of the insulating ability of the body tissues against heat loss but, even more important, an indication of the efficiency of the circulation under varying environmental conditions. Briefly, the conductance is the calories of heat lost from the body per hour per square meter of surface area per degree centigrade difference in temperature between rectum and skin. Skin and rectal temperatures are readily measured by standard methods. Heat loss is either measured directly or calculated from heat production by making a correction for storage of heat. When a premature infant is exposed to warm or cool air, there is a rapid change in storage of body heat, which is difficult to estimate accurately from rectal and skin temperature measurements alone. For periods of half an hour to an hour the amount of heat stored or lost from the body may be as much as 50 per cent of that produced. Furthermore, the infant may cry, thereby accentuating the difficulties of measurement of oxygen consumption. The indirect calculation of heat loss from measured heat production is thus made doubly difficult and a direct measurement becomes desirable. The calorimeter to be described is useful because of the rapidity of observation which it makes possible and because it dispenses with the measurement of oxygen consumption altogether under conditions in which this is difficult or does not provide a true index of metabolic activity.

The work of Lusk and DuBois,[4] extending over a period of thirty years, produced the Atwater-Rosa-Benedict adiabatic calorimeter,[5] the standard instrument for measuring heat loss and heat production in men and animals. However, the cost of making and operating this calorimeter has limited its use to a few institutions. Likewise, the partitional calorimeter of Winslow, Herrington and Gagge,[6] the differential calorimeter of Benedict,[7] and the automatic recording calorimeter of Barrows and associates [8] all require expensive equipment and complicated procedures.

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4. DuBois, E. F.: Basal Metabolism in Health and Disease, ed. 3, Philadelphia, Lea & Febiger, 1936.

5. Benedict, F. G., and Carpenter, T. M.: Respiration Calorimeters for Studying the Respiratory Exchange and Energy Transformations of Man, Publication 123, Carnegie Institution of Washington, 1910.

6. Winslow, C.-E. A.; Herrington, L. P., and Gagge, A. P.: A New Method of Partitional Calorimetry, Am. J. Physiol. **116**:641 (Aug.) 1936.

7. Benedict, F. G.: Zwei elektrisch kompensierte Emissions-Kalorimeter für kleine Tiere und Säuglinge und für Erwachsene, in Abderhalden, E.: Handbuch der biologischen Arbeitsmethoden, Berlin, Urban & Schwarzenberg, 1934, sect. 4, pt. 13, p. 689.

8. Barrows, W. M., Jr.; Murlin, W. R.; Nutter, P., and Murlin, J. R.: A New Automatic Respiration Calorimeter, and a Study of the Influence of Sugars on Heat Production in the Rat, J. Nutrition **13** (supp.):17 (June) 1937.

The calorimetric technic described in this report is simple, flexible and sufficiently precise. The technic is based on a simple principle of heat transfer. The principle used is that the heat transfer from air on one side of a wall to air on the other side is proportional to the difference between the measured air temperatures on the two sides of the wall. That is, when the temperatures are substantially constant,

$$H = C(T_c - T_r)t.$$

H is the heat transferred through the wall in the time interval, t; C is a constant to be determined by calibration; T_c and T_r are the measured temperatures of the air on the inside and the outside of the wall, respectively.

THE CALORIMETER

The calorimeter was constructed from the open circuit cot chamber apparatus for measuring the respiratory exchange of premature infants which has been described previously.[9] Following is a brief description of the modifications which converted this respiratory chamber into a *direct* calorimeter, capable of measuring heat loss.[10]

The chamber itself is a rectangular copper box, large enough to accommodate infants of 3,000 Gm. or less. The lid is made air tight by an oil seal. A pump draws air through the box at an adjustable and measured rate. Before entering the box the air passes through absorption bottles which remove all water and carbon dioxide. After leaving the box a sampler devised by Barker[11] deflects small aliquot samples through a by-pass for measurement of oxygen and carbon dioxide while the main current of air passes through two bottles of sulfuric acid for measurement of the total loss of water from skin and lungs. The ventilation rate is adjusted, on the basis of previous experience, to the weight of the infant, so that relative humidity remains constant. Since air temperature is also constant, the water content of the box does not change and residual analyses for water vapor are unnecessary.

The additions which make it possible to measure the heat transfer are suitably placed thermocouples which measure the temperature of the air inside the box, at points near the walls, and of the air outside the box.

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9. Gordon, H. H.; Levine, S. Z.; Deamer, W. C., and McNamara, H.: Respiratory Metabolism in Infancy and in Childhood: XXIII. Daily Energy Requirements of Premature Infants, Am. J. Dis. Child. **59**:1185 (June) 1940.

10. It should be emphasized that our calorimeter represents an adaptation of a previously existing respiratory chamber. If an entirely new calorimeter were to be constructed, numerous features of design could be incorporated in it which would utilize the physical principle involved to better advantage.

11. Barker, S. B., and Smyth, E.: A Mechanical Pump for the Drawing of Gas Samples, Proc. Soc. Exper. Biol. & Med. **38**:745 (June) 1938.

Thermocouples and Potentiometers.—Accuracy of temperature measurement in a diffusible substance can be attained by stirring or by the use of a sufficiently large number of thermometers. Stirring within the box is undesirable, for technical reasons and because it might have an unwanted effect on the baby. The second plan was therefore employed, and temperatures of the air inside the box are measured with copper-constantan thermocouples, accurate to 0.01 degree C. and soldered to sheets of copper supported about 1 cm. away from the walls of the box and distributed as shown diagrammatically in figure 1. During an experimental period the temperature of the couples is measured every three to five minutes.

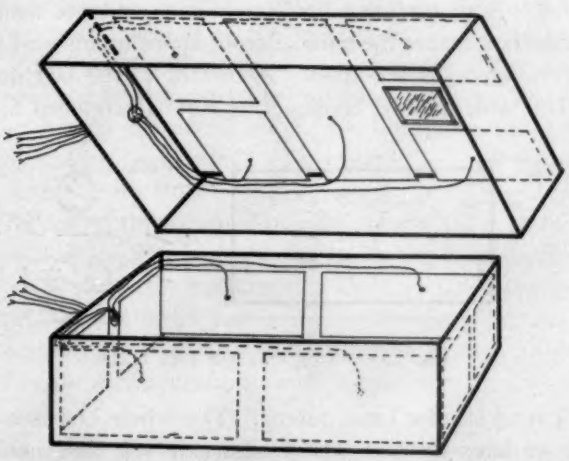

Fig. 1.—Diagram of the arrangement of the thermocouples within the calorimeter box. The copper sheets, to each of which is soldered a thermocouple, are shown in position, about 1 cm. from the chamber walls. Those at the bottom of the box are not shown.

The thermocouples are arranged in series in 4 circuits, as shown in the wiring diagram (fig. 2). Circuit 1 connects the four thermocouples near the bottom of the box (not shown in fig. 1). Circuit 2 connects the four thermocouples near the sides of the box, and circuit 3, the four near the top of the box, with the exception of the large copper sheet in the center, which is supplied by the single thermocouple of circuit 4. The remaining circuits, 5, 6 and 7, supply thermocouples measuring the calorimeter wall temperature, the room air temperature and the rectal temperature of the baby. Circuits 1, 2, 3 and 6, it will be noted, supply four thermocouples each; hence the potentiometer readings for these circuits must be divided by 4. The arrangement of these thermocouples

is empiric, and another arrangement might serve equally well. The potentiometer used is a Leeds and Northrup "student's" type, with an HS galvanometer of 15 ohms resistance. The reference junctions are placed in a vacuum flask kept at room temperature.

The current for the potentiometer was supplied by two dry cells and adjusted by means of the resistance (R1; fig. 2) of about 7,000 ohms. Instead of the current's being standardized by use of a standard cell, the rectal thermocouple was employed. By placing this in water at known temperatures the potentiometer current was so adjusted that 1 step of the dial switch, or 100 divisions of the slide wire, was equivalent to 1 degree C. It was assumed that an occasional adjustment of the current was sufficient, since the current drawn from the cells was very small.

The Bed.—A requirement for determining accurate temperatures of air within the box is that the circulation of air be unimpeded and uniform from observation to observation. Accordingly, the bed on which the baby lies is a wide-meshed hammock of tightly stretched fishline. The

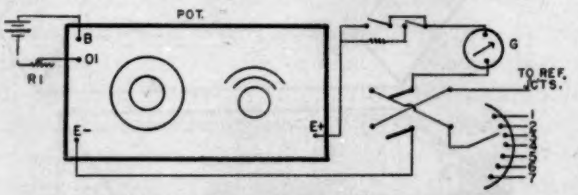

Fig. 2.—Wiring diagram (see text).

framework is of slender brass tubing. The whole bed is coated with a thin layer of latex rubber, which makes it soft and nonhygroscopic. There is a suitable opening in this hammock to permit the collection of urine and stool under oil.

The Temperature of the Air Outside the Box.—The calorimeter is situated in an air-conditioned room. However, a room without accurate control of temperature and humidity would be entirely suitable provided changes in temperature were slow and regular. It is important only that the time average of the room temperature be measured.

The thermocouples for measuring the room air temperature are four in number, connected in series and situated two above and two below the calorimeter. The room air is stirred by an electric fan. This decreases the thermal effect of persons moving about the room to a negligible value. It is necessary that this fan be in a fixed position. The absolute accuracy with which the average room air temperature during a period is measured is not known, but in view of the constancy of the results obtained it is believed that relative differences in temperature, which are more important than absolute values, have been determined

to within 0.05 degree C. or better. This opinion is strengthened by the fact that the average room temperature during a period was rarely found to differ by more than 0.050 degree C. from the average of the values obtained in the ten minutes preceding and following a period.

Storage of Heat in the Calorimeter Walls.—The calorimeter walls are made of thin lacquered copper, and in addition there is a certain amount of oil in the seal. Our attempts to measure heat storage in these walls did not increase the accuracy of the instrument, and we no longer measure the wall temperatures. It is possible that in very short periods and in a room with very stable air temperature this measurement might be worth while.

Loss of Heat to Circulating Air.—The difference in temperature between inlet and outlet air was usually less than 1 degree C. because the outlet vent was low and at the foot of the box—the coolest spot in the box. Assuming a difference of 1 C., then, the calories lost in this way are found by multiplying the ventilation rate (250 liters per hour) by the density of air (1.2 Gm. per liter) by the specific heat (0.00024 large calories per gram). This gives the small figure of 0.073 calories per hour. With more heat loss (larger babies) this value would be larger. If a perfect proportionality were preserved for all heat productions, the heat lost by this route would be included in the constant, C, obtained in calibrating the instrument. Only so far as proportionality is not preserved between heat loss by this route and total heat loss does failure to measure inlet and outlet temperature introduce an error. We do not measure these temperatures, and justification for this is obtained by the results.

Calibration of the Calorimeter.—The complete equation used in calculating the heat loss from the calorimeter by radiation and convection is:

$$H = C\,(T_c - T_r)\,t \pm S \pm A.$$

H is heat loss; C, the heat flow constant; T_c, the average air temperature within the calorimeter; T_r, the room air temperature; t, the time; S, storage in the walls of the calorimeter, and A, the loss of heat to the air leaving the box. For the reasons already given, S and A need not be measured. Omitting S and A and rewriting the equation,

$$C = \frac{H}{(T_c - T_r)\,t}$$

If heat production equals heat loss, and heat production is known, then C may be calculated.

A known source of heat customarily used in calorimetric practice is an alcohol flame, and such a flame was one of the two types of heat sources used in calibrating our instrument. However, as the heat distribution of an alcohol flame is different from that of a baby, we also

used an "artificial baby." One of the limiting factors in the accuracy of a calorimeter is the constancy of the calibration when sources of heat of different types are used. For example, the heat loss from the "artificial baby" was divided approximately as 70 per cent radiation and 20 per cent convection; furthermore, its large surface area caused the air in different parts of the box to be similar in temperature. For an alcohol flame, however, even with the baffle arrangement pictured in figure 3, there was more convection than radiation and the small size of the source of heat resulted in a very irregular distribution of air temperatures within the box. With the baffle over the lamp the values for C coincide with those

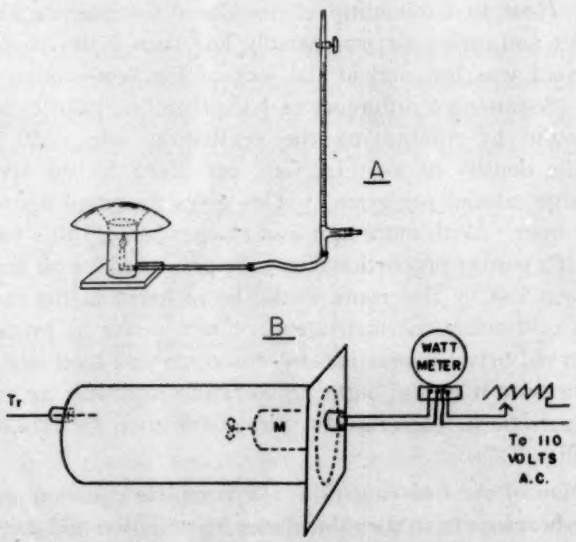

Fig. 3.—*A*, the alcohol flame, showing the baffle arrangement which prevents too great a concentration of heat. *B*, the "artificial baby," showing the motor (*M*) within, the thermocouple (*Tr*), the watt hour meter and the rheostat.

for the "artificial baby" although they do not with those of a bare flame. However, since the flame with its baffle is very different, as pointed out, from the "artificial baby" and yet leads to the same value for C, the use of the calorimeter for widely different distributions of heat is justified.

The Artificial Baby.—A diagram of this instrument is shown in figure 3. It is a water-filled copper cylinder, 30 cm. long and 12 cm. in diameter. One end is capped by a flange for holding an electric motor. The latter serves as the source of heat and it also stirs the water. The electric input, all of which is converted to heat, is measured by a watt hour meter. The motor is of the "squirrel cage" type, and since there are no brushes, it can run under water.

The surface area of the cylinder is 0.143 square meter, corresponding to that of a premature infant of approximately 1,800 Gm.[12] It requires 3.411 calories to raise the temperature of the cylinder and its contents (including the water) 1 degree C. A thermocouple serves to measure changes in temperature which occur during a run. The surface of the cylinder is painted black, in imitation of the human skin, which radiates heat like a perfect black body radiator regardless of skin color.[13]

TABLE 1.—*Heat Flow Constant Obtained with Different Sources of Heat at Different Room Temperatures and Rates of Heat Production*

Heat, Cal./Hr.	Room Temperature, C.	Heat Source	Length of Period, Min.	Heat Flow Constant
		A. First Series		
8.7	24.0	Alcohol flame	45	0.054
8.7	24.0	Alcohol flame	60	0.052
10.0	21.7	Alcohol flame	45	0.055
10.0	21.7	Alcohol flame	45	0.056
10.7	23.3	Alcohol flame	45	0.056
10.7	23.3	Alcohol flame	45	0.054
8.5	23.9	Electric motor	30	0.054
7.1	25.0	Electric motor	35	0.052
7.7	22.9	Electric motor	26	0.056
9.5	23.3	Electric motor	41	0.050
			Average	0.0539
		B. Second Series		
5.0	25.5	Electric motor	31	0.044
5.0	25.5	Same, position shifted	29	0.045
4.4	28.6	Electric motor	23	0.040
5.4	23.7	Electric motor	28	0.042
4.5	24.0	Electric motor	30	0.045
14.3	26.0	Alcohol flame	35	0.045
14.3	26.0	Alcohol flame	35	0.044
8.5	25.6	Alcohol flame	30	0.042
8.4	27.2	Alcohol flame	30	0.044
8.4	27.2	Alcohol flame	30	0.040
18.0	24.0	Alcohol flame	35	0.045
18.0	24.0	Alcohol flame	35	0.045
8.8	24.9	Same, but flame inside copper shell of artificial baby	30	0.045
			Average	0.0435

The Value of the Heat Flow Constant.—The values for this constant obtained in the calibration of this calorimeter with the alcohol flame and with the electric motor appear in table 1. The first series of values were obtained with the calorimeter in its original form, and the second, after an increase in the area of the copper plates attached to the thermocouples.

12. Klein, A. D., and Scammon, R. E.: Relations Between Surface Area, Weight and Length of the Human Body in Prenatal Life, Proc. Soc. Exper. Biol. & Med. **27**:456 (Feb.) 1930.

13. Hardy, J. D.: The Radiation of Heat from the Human Body: III. The Human Skin as a Black Body Radiator, J. Clin. Investigation **13**:615 (July) 1934.

The first series ranged from 0.050 to 0.056, with an average of 0.0539. The second series ranged from 0.040 to 0.045, with an average of 0.0435.

The increase in the area of the copper sheets lowered the value for C in the second series. It is to be expected that the value of C will be different for different arrangements of the thermocouples or of the copper sheets to which they are soldered. The method requires only that with any one arrangement the value of C shall not depend on room temperature or rate of heat loss, and that it shall also be independent of the kinds of heat sources used in the box. If the heat loss to be measured is very

TABLE 2.—*Observations with Alcohol Flame: Comparison of Direct and Indirect Calorimetry*

				Direct Calorimetry		Indirect Calorimetry	
Room Temperature, C.	Length of Period, Min.	Alcohol Burned, Cc./Hr.	Heat Production, Theoretic, Cal./Hr.	Measured Heat (Total), Cal./Hr.	Difference from Theoretic, per Cent	Heat Production, Calculated from Oxygen, Cal./Hr.	Difference from Theoretic, per Cent
28.5	45	1.86	9.50	9.53	+ 0.3	8.84	— 6.9
28.4	45	1.84	9.44	9.92	+ 5.1	9.10	— 3.6
23.3	45	2.27	11.60	11.73	+ 1.1	11.38	— 1.9
23.3	45	2.35	12.08	11.85	— 1.9	11.64	— 3.6
21.8	45	2.22	11.36	11.08	— 2.5	10.92	— 3.9
21.7	45	2.22	11.36	11.28	— 0.7	11.02	— 3.0
24.0	60	1.86	9.54	9.92	+ 4.0	8.56	—10.3
24.0	45	1.97	10.07	10.19	+ 1.2	9.36	— 7.1
23.2	30	2.71	13.88	13.76	— 0.9	.....	.....
23.9	45	1.40	7.15	6.99	— 2.2	6.97	— 2.5
23.9	45	1.41	7.21	7.14	— 1.0	7.16	— 0.7
23.8	30	1.49	7.62	7.74	+ 1.6	.....	.....
	Average.....				+ 0.3		— 4.4

small, the difference in temperature will also be too small to be measured with sufficient accuracy.

Table 2 presents a comparison of the predictions of heat production based on gas analysis and on measurements of heat loss with an alcohol flame as the source of heat. The value for C used was that obtained in the first series of calibrations of the calorimeter with the electric source of heat when the thermocouple arrangement was the same as that obtaining during the first series of calibration figures.

The range of deviations of measured heat loss from the theoretic was from + 5.1 per cent to — 2.5 per cent, with an average for the twelve periods of + 0.3 per cent.

Operation of the Calorimeter.—The operation of the calorimeter is the same whether one is determining the value for C or measuring the heat loss of a baby. After a preliminary period of thirty-five minutes the experimental period begins. Measurements of the temperature of

each thermocouple circuit are made as rapidly as possible, in succession. These include the four circuits supplying the thermocouples within the box, the circuit to the room air, and the rectal thermocouple. The air temperature, however, is measured after every reading of each of the other circuits. Before and after each period the room air temperature is measured every half-minute for ten minutes. During the run the skin temperature at four different places is recorded on a Leeds and Northrup "Micromax" recording thermometer. In addition, before the baby is placed in the box and after he is taken out, his skin temperature is measured by a Hardy radiometer at twelve different sites. During the run another observer attends to that part of the procedure concerned with measurement of the respiratory exchange and of the evaporation of water.

The calculations in a sample observation follow:

Baby	Weight	Height	Age
Frank T.	2,320 Gm.	46.5 cm.	12 days

Length of period, 35 minutes

Average temperatures during period:

A. Room air temperature: Before period..... 24.80 C.
During period..... 24.86 C.
After period..... 24.89 C.
Average..... 24.85 C.

B. Temperatures inside box:
1. Top of box: Circuit 4..... 27.84 C.
Circuit 3..... 28.36 C.
Average..... 28.10 C.
2. Sides and ends: circuit 2..... 26.68 C.
3. Bottom: circuit 1..... 26.44 C.
Average..... 27.07 C.

C. Heat loss by radiation and convection per hour
$= O(Tc - Tr)t$
$= 0.0435(27.07 - 24.85)60 =$..... 5.79 cal./hr.

D. Heat loss by evaporation
$= 0.58 \times$ Gm. of water collected
$= 0.58 \times 2.167 \text{ Gm.} \times \frac{60 \text{ minutes}}{35 \text{ minutes}} =$..... 2.16 cal./hr.
(relative humidity within box constant during period)

E. Total heat loss..... 7.95 cal./hr.

F. Heat produced (determined by gas analysis)..... 8.12 cal./hr.

SUMMARY

A direct calorimeter for measuring the heat loss of small and of premature infants is described. Among the advantages of this type of calorimeter over the traditional adiabatic types employed in studies of human temperature regulation are the following: (*a*) sufficient accuracy with simpler and less expensive apparatus; (*b*) more rapid operation, a factor of great importance in the study of thermal adjustments taking place rapidly, as in premature infants.

525 East Sixty-Eighth Street.

RATIO OF CARDIOVASCULAR MALFORMATIONS TO OTHER TYPES OF HEART DISEASE IN CHILDREN

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This study concerns the incidence of congenital heart disease in relation to that of all heart disease as observed at the Children's Memorial Hospital in Chicago.

In 1937 Roberts [1] stated that there was "no trustworthy estimation of the incidence of congenital heart disease." White [2] tabulated nineteen reports on the subject from various parts of the world, including the United States, England, South Africa and Ceylon, and the rates (relative to all heart disease) varied from 0 to 5.5 per cent. These studies obviously were not directed at children and presumably included all age groups. Levine [3] stated that the incidence of congenital heart disease is probably not more than 1 to 2 per cent of all heart disease in persons over 12 years of age and added that the figure will be much greater for persons under that age. Most of the recent investigations concerning the topic have been conducted among school children. Robey,[4] in Boston, noted the presence of congenital lesions in 11 per cent of 625 children with organic heart disease. The age of the group was 6 to 15 years. Goodman and Prescott [5] found that in 8 per cent of 528 New York school children with heart disease the condition was congenital. Ninety-eight per cent of his subjects, however, were 14 to 17 years of age. In Louisville, Ky., Weiss [6] studied 221 school children, aged 6 to 14, with organic heart disease and found 30.8 per cent to have congenital lesions.

From the Cardiac Service of The Children's Memorial Hospital.

Read at a meeting of the Chicago Pediatric Society, Feb. 17, 1942.

1. Roberts, J. T.: The Incidence of Congenital Heart Disease in the New Orleans Charity Hospital, J. Tech. Methods **17**:108 (Sept.) 1937.

2. White, P. D.: Heart Disease, ed. 2, New York, The Macmillan Company, 1937, p. 180.

3. Levine, S. A.: Clinical Heart Disease, ed. 2, Philadelphia, W. B. Saunders Company, 1940, p. 198.

4. Robey, W. H.: A Cardiac Survey of Children in Boston Public Schools, Nation's Health **9**:21 (Dec.) 1927.

5. Goodman, M., and Prescott, J. W.: Heart Disease Among Adolescent Children of New York City, J. A. M. A. **103**:157 (July 21) 1934.

6. Weiss, M. W.: The Incidence of Rheumatic and Congenital Heart Disease Among School Children of Louisville, Ky., Am. Heart J. **22**:112 (July) 1941.

Rauh's [7] figure in Cincinnati was 45 per cent of 301 cases. The highest incidence noted was that determined by Sampson, Christie and Geiger [8] in San Francisco. Of 485 school children with heart disease they found the condition to be congenital in 58 per cent. In the same city, Richter [9] noted an incidence of congenital disease of 43.8 per cent. Macera and Ruchelli,[10] in Buenos Aires, found 240 cardiopathies in 10,000 school children, of which 16.25 per cent were on a congenital basis.

In the literature previously cited one promptly notes that the proportion of congenital to rheumatic heart disease is distinctly higher in those localities where the climate is milder and rheumatic infection less prevalent.

TABLE 1.—*Number of Children with Heart Disease for Each Year of Life*

	Year of Life													
	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
Congenital heart disease														
Acyanotic and with cyanose tardive	3	6	4	6	7	10	10	3	4	5	7	7	4	76
Cyanotic	..	..	3	4	..	..	2	1	..	3	..	1	..	14 — 90
Rheumatic heart disease	..	..	..	1	3	4	9	10	12	13	34	30	30	146
Heart disease, type ?	..	..	..	..	..	..	..	1	..	1	..	..	1	3
Total number of cases	3	6	7	11	10	14	21	15	16	22	41	38	35	239

TABLE 2.—*Ratio of Children with Congenital Cardiac Anomalies to Total Number of Children with Heart Disease*

	Year of Life												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Percentage congenital	100	100	100	91	70	71	57	27	25	36	17	21	11

ANALYSIS

The subject was approached by studying the records of all patients in the active file of the cardiac disease clinic, with particular reference to diagnosis and age, as of Aug. 1, 1941. This included a total of 598 patients. Of these, 580 were listed in the outpatient department and 18 were hospitalized at the time. The age span covered the first 13 years of life.

The results are shown in table 1. Patients other than those with a definite diagnosis of heart disease, namely, those with potential or possible

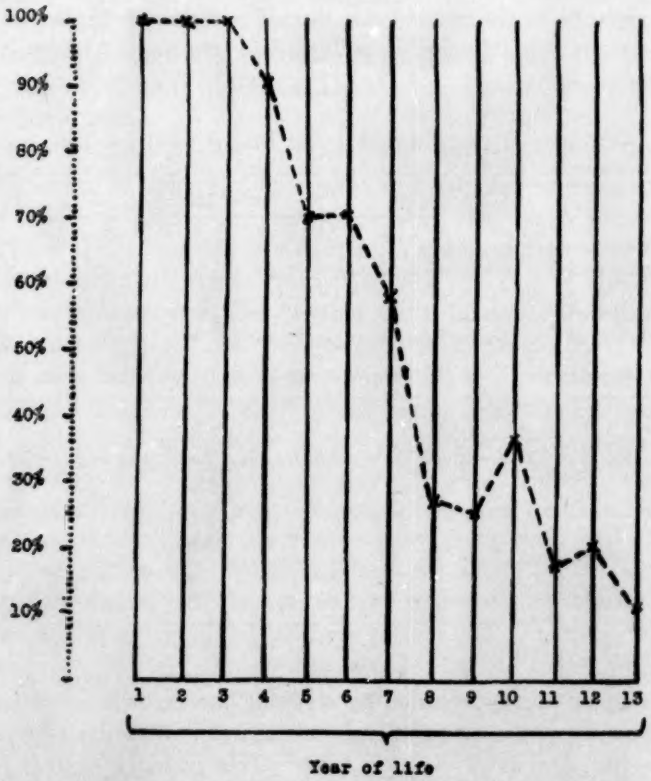
7. Rauh, L. W.: The Incidence of Organic Heart Disease in School Children, Am. Heart J. **18**:705 (Dec.) 1939.

8. Sampson, J. J.; Christie, A., and Geiger, J. C.: Incidence and Type of Heart Disease in San Francisco School Children, Am. Heart J. **15**:661 (June) 1938.

9. Richter, I. M.: Incidence and Variety of Heart Disease in School Children of San Francisco, J. A. M. A. **97**:1060 (Oct. 10) 1931.

10. Macera, J. M., and Ruchelli, A. P.: Cardiopatías congénitas; la frequencia en 10,000 escolares de la capital federal, Día méd. **12**:628 (July 15) 1940.

heart disease, are not included. The children with congenital heart disease were divided into two groups. The first included the acyanotic patients, i. e., those with no shunt of arterial or venous blood, and the group with so-called *cyanose tardive,* the patients with arteriovenous shunt in whom cyanosis is only a terminal or transient manifestation. The second group, the cyanotic, were primarily patients with venoarterial shunt.



Ratio of number of children with congenital heart disease to total number with heart disease for first thirteen years of life.

Of the 598 patients studied, 239 (40 per cent) had a definite diagnosis of heart disease. In 90 (37.6 per cent) of these 239 the disease was on a congenital basis. The percentage of children with congenital heart disease as compared with the total number with organic heart disease for each year of life is shown in table 2 and more graphically illustrated in the chart. This incidence was 100 per cent for each of the first three years of life and declined to 11 per cent in the thirteenth year.

The closest comparison to the observations in the previously mentioned studies among school children might be found in the group

between 6 and 13 years of age. Of the 185 children, 47 (25.4 per cent) had congenital heart disease. The analogy of this group to ordinary school children, however, is not strictly correct, for some of these children were hospitalized with rheumatic carditis at the time of this study. Others, who attended schools for crippled children, would not be physically fit for the usual public school.

Fourteen (15 per cent) of the patients with congenital heart disease showed cyanosis. One would rather expect the greater number of patients with cyanosis to be present in the earlier age groups, but of the 9 children with congenital malformation in the first two years of life none showed cyanosis.

It is recognized that the picture resulting from this study represents a cross section at a given time of life and that as the years elapse these percentages will alter markedly. The number of persons with congenital heart disease will remain relatively static but decline slowly as deaths occur because of the cardiac lesions themselves or, particularly, from other causes. On the other hand, the number of children with rheumatic heart disease will increase as uninfected children acquire rheumatism with cardiac damage and certain of the "rheumatic potential" group (193 in this series) acquire carditis.

SUMMARY

The records of 598 children attending a cardiac disease clinic were analyzed. Of this number, 239 (40 per cent) showed definite heart disease. In 90 (37.6 per cent) of these 239, the disease was on a congenital basis. The incidence of congenital heart disease relative to the total amount of heart disease for each year of life is tabulated. This figure was 100 per cent for each of the first three years of life and declined to 11 per cent in the thirteenth year. In the age group (6 to 13 years) approximating that of elementary school children, the incidence was 25.4 per cent. Cyanosis was recorded in 14 (15 per cent) of the 90 patients but showed no preponderance in infancy.

The proportion of patients with congenital anomalies is comparatively high for an area in which rheumatic fever is prevalent.

715 Lake Street.

DISCUSSION

DR. STANLEY GIBSON: It is important to emphasize that Dr. Wallace's figures represent a cross section of the cardiac disease outpatient clinic of Children's Memorial Hospital taken at a definite date. These figures will naturally vary considerably from those for a hospital group of children with cardiac disease. Some years ago Dr. Clifton and I reviewed 1,950 consecutive autopsies at Children's Memorial Hospital, among which we found 105 instances of congenital heart disease. Dr. Wallace stated that there were no cyanotic patients under the age of 2 years in his group. Among our hospital patients there were 17 children with

cyanosis, and the great majority were less than 2 years of age. This is not surprising. The cyanotic infants are more likely to enter the hospital than the outpatient department.

I was interested in his observation that no child under the age of 4 was found to have a humming top murmur. This emphasizes the fact that the typical murmur of patent ductus arteriosus is of slow evolution. I have notes on 46 children with typical humming top murmurs. In not a single instance was the murmur reported to occur in a child under 1 year of age.

DR. PHILIP ROSENBLUM: Do any of the histories show more than a single child in a family with congenital heart disease?

DR. JULIUS H. HESS: I think it is fortunate that Dr. Gibson covered the discussion on congenital heart disease with cyanosis, and I hope, in order to avoid any misunderstandnig, that when he publishes his report Dr. Wallace will emphasize that he did not include hospital patients. I believe there may be some criticism unless he does emphasize that his patients were ambulatory. A good many cyanotic patients are seen among young persons with cardiac disease and patients who die early. I mention this simply in order to protect the paper.

DR. JAMES H. WALLACE: I should like to thank Dr. Gibson for bolstering up this paper with his discussion.

In reply to Dr. Rosenblum's question, I believe that at St. Luke's clinic there is a family in which 2 children have patent ductus arteriosus. Offhand, I can think also of a pair of twins here, one of whom has a situs inversus and the other an interventricular septum defect.

Dr. Hess brought up the question of cyanotic patients in the hospital. This study represents a cross section as of a given date, and at that particular time there were no cyanotic babies with congenital heart disease in the hospital. I must emphasize this fact, for without cognizance of it this paper would be misleading. Consider, for instance, the potential rheumatic group; the incidence of heart disease is going to be considerably higher in this group five years from now.

This investigation did not consider the future expectancy of heart disease in the subjects studied nor the cases in which fatalities had already occurred. It considered only the status of living children at a given time.

PROPHYLACTIC USE OF HUMAN SERUM AGAINST CONTAGION IN A PEDIATRIC WARD

FURTHER OBSERVATIONS, WITH SPECIAL REFERENCE TO MEASLES AND RUBELLA

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The intramuscular administration of parental blood serum for the prophylaxis of contagious diseases has been a routine procedure in the Morrisania City Hospital since 1934. Our experience with this method up to 1937 was the subject of a previous communication.[1] The following considerations have prompted this report. Firstly, we wish to set forth additional evidence of the value of human serum as a prophylactic measure. Secondly, we desire to call attention to the simplification of the procedure since the establishment of a plasma bank. Thirdly, we feel that a detailed discussion of the technic of the procedure will be of benefit. Fourthly, we wish to attempt to explain the failure to protect the children in some hospitals where serum or placental extract was employed. Lastly, we wish to supplement our previous observations on contagion by a report on the prophylactic value of serum during an epidemic of measles and rubella.

Thus far no prophylactic measure or organized effort has been launched to safeguard the susceptible group of sick infants and children in the wards against communicable diseases. It is true that great stress has been laid on the importance of isolation, and rightly so. As a rule, however, provision is not made for complete isolation. Since the incubation periods of the communicable diseases vary from five to twenty-one days, it is obvious that the usual two or even three days of detention in the observation ward is of limited value. A patient trans-

From the Department of Pediatrics, Morrisania City Hospital.

1. Barenberg, L. H.; Greene, D., and Grand, M. J. H.: Prophylactic Use of Parental Blood Serum Against Contagion in a Pediatric Ward, Am. J. Dis. Child. **57**:322 (Feb.) 1939.

ferred to the main ward after forty-eight hours may still be in the incubation period of a contagious disease and is thereby capable of acting as a source of secondary contagion. Therefore very little is accomplished by isolation in the way of prevention. Even in hospitals where the so-called cubicle system has been instituted, the problem of cross infection has not been entirely solved. As pointed out in a previous paper,[1] the problem is more acute in the surgical pediatric ward, where emergency work is often necessary. Moreover, there is an added hazard attendant with the transportation of a patient postoperatively to a contagious disease hospital. It is not surprising, therefore, that parents are reluctant to hospitalize children, since contagious diseases are often contracted during the hospital stay. There is no doubt that the problem of preventing the spread of contagion in a pediatric ward demands immediate solution. Indeed, a recent editorial in a medical journal [2] challenges the pediatrician to offer a solution to this problem.

We shall not delve further into the question whether human serum possesses protective substances against contagious diseases. Suffice it to say that the presence of antibodies in the blood serum which act with a high degree of specificity is now well established. This has been the experience in our previous studies,[3] and further clinical observation has served only to strengthen our reliance on serum as a prophylactic measure. In our first paper on this subject,[1] we reported the results of a three year study of the routine inoculation with parental serum of every patient admitted to the pediatric ward of the Morrisania City Hospital. The results indicated that by means of this procedure we were able to maintain a medical pediatric ward constantly open and free from outbreaks of contagious disease. In the surgical pediatric ward, which served as a control and where prophylactic inoculation with serum was not employed, frequent outbreaks of secondary contagion occurred, with the inevitable closure of the ward to admissions. The average annual loss in this service amounted to thirty-four days.

The second study [3a] was undertaken to determine the exact nature of the protection which parental serum apparently conferred on its recipients. This investigation was based on observations of the effect of human serum on children with a positive Schick reaction. It was found that the injection of human serum brought about a reversal of the Schick reaction as well as a significant rise in the antitoxin titer

2. A Poser for Pediatricians, editorial, New York State J. Med. **40**:765 (May 15) 1940.

3. (*a*) Barenberg, L. H.; Greenstein, N. M., and Leighton, B.: Effect of Human Serum on the Schick Reaction and Blood Antitoxin Titer, Am. J. Dis. Child. **60**:36 (July) 1940. (*b*) Barenberg, Greene and Grand.[1]

of the blood. Human serum protected one half of the children for over twenty weeks; in the remainder (the younger group) the immunity was of shorter duration (three and two-tenths weeks).

The present study, the third in the series, is a continuation of observations of the effect of human serum on contagion and embraces a period of three years. The protective value of serum in measles was undertaken for clinical study. This disease constitutes one of the major problems with which pediatric wards have to contend. Another important consideration was the fact that during 1940-1941 a severe and widespread epidemic of measles was raging. During this time, 85,257 cases of measles were reported in New York city, the largest number of such cases reported in the history of the Bureau of Preventable Diseases during a single year (table 1). No hospital, as far as we are aware, escaped quarantine for measles, and some were forced to close the wards

TABLE 1.—*Number of Reported Cases of Measles in New York (1934-1941)*

Year	No. of Cases
1934	5,015
1935	28,490
1936	36,548
1937	10,659
1938	34,604
1939	3,653
1940	10,496
1941*	79,301

* First half.

to admission several times during this period. Thus the prophylactic serum inoculation was put to a severe test.

PROCEDURE AND MATERIAL

In general, the routine followed in the present investigation, with some modification, was similar to that reported previously. Thirty cubic centimeters of pooled parental serum was injected intramuscularly into the buttock of every newly admitted patient over the age of 3 months, from July 1, 1938 to March 1, 1941. Since that time, an equal amount of pooled bank plasma has been administered. The plasma was supplied to us in 90 cc. vials to which merthiolate in a concentration of 1:10,000 had been added. When a case of primary contagion occurred, all the children who had not received plasma within the previous ten day period were reinoculated with the same amount of plasma as soon as they had reached the tenth day following the previous inoculation.

This study embraces a three year period of observation—from July 1, 1938 through June 30, 1941. This includes both the medical (3 west) and the surgical (3 east) ward at the Morrisania City Hospital. A survey was made to determine the incidence of primary and secondary cases of measles during this period in five other New York city hospitals. Four of these are large municipal institutions and care for the same type of population that is found at Morrisania City Hospital.

The total number of admissions to each pediatric service was noted. An attempt was made to obtain information concerning the number of days lost because of quarantine and what, if any, prophylactic measures had been employed. Cases of contagious disease were considered as primary if the number of days of hospitalization prior to the onset of symptoms did not exceed the upper limits of the incubation period; all other cases were called secondary. We consider the upper limit of incubation for measles to be fourteen days.

Table 2, which represents a comparison of our data with those of other hospitals, affords a clear picture of the results. The seven pediatric units studied were divided into three groups according to the type and character of the prophylactic measures which were employed.

Group 1 consists of two units (3 west and hospital A) where routine prophylactic injections of pooled serum or plasma were given without interruption during the entire period of observation.

TABLE 2.—*Comparison of the Incidence of Primary and Secondary Cases of Measles in Six New York Hospitals or Units During the Three Year Period from July 1, 1938 Through June 30, 1941*

	Procedure						
	Complete		Partial		None		
Hospital or unit	3 west	A	3 east	D	B	C	E*
Number of admissions	2,410	2,327	4,238	2,385	4,030	1,909	5,341
Types of prophylaxis †	P.S.	P.S.	P.S.	P.S. C.S. I.G.	X	C	C
Primary cases	6	2	10	21	19	14	65
Secondary cases	0	1	7	19	7	11	25

* Data for nine months only (Oct. 1, 1940 through June 30, 1941).
† P.S. indicates pooled serum or plasma; C.S., convalescent serum; I.G., immune globulin; C, cubicle arrangement of ward; X, none.

Group 2 comprises two units (3 east and hospital D) where injections of serum were not given routinely. The surgical ward (3 east) consists of five independent surgical services with a resident staff changing frequently. The routine injections were not carried out as recommended by us. Some of the patients were not inoculated at all, while others received the injection some time after admission. In hospital D, an attempt was made to institute our method of procedure. Some patients received convalescent measles serum, while others were inoculated with immune globulin or pooled parental serum. However, these measures were initiated only when the epidemic of measles was already under way. A number of cases had already been observed, and one member of the resident staff had contracted the disease. The injections of serum were not given routinely on admission, nor was the amount as we recommend. There were repeated exposures, and the exposed children were not reinoculated after ten days.

Group 3 consists of three units (hospitals B, C and E) where no injections of serum were given at any time. Hospitals C and E relied solely on the cubicle arrangement of the ward. The data from hospital E cover a period of only nine months (Oct. 1, 1940 through June 30, 1941).

ANALYSIS OF DATA

Table 2 reveals that no secondary cases of measles occurred in the medical pediatric ward (3 west) of the Morrisania City Hospital, where pooled serum inoculations were given routinely to 2,410 children admitted during the period of observation. For that matter, no secondary cases of other contagious diseases, such as scarlet fever, pertussis, varicella, diphtheria and mumps, developed. This unit was not quarantined at any time, and the service was not interrupted even though primary cases were discovered. Our record during the preceding years had proved that we were able to prevent the occurrence of secondary cases of contagious disease by means of the routine injection of pooled serum or plasma on admission. In view of these results, the Department of Hospitals did not deem it necessary to close the ward in the event that a primary case appeared. While all other pediatric wards throughout the city were quarantined for measles during the 1940-1941 epidemic, with consequent diminution of the available pediatric beds, the maintenance of an open pediatric service proved of inestimable value. In hospital A, where the same routine was followed, only 1 secondary case of measles occurred among 2,327 admissions. On the other hand, in the three units where prophylactic injections of serum were not employed, the expected number of secondary cases of measles was encountered. In hospital B, there were 6 cases; in hospital C, 11 cases; and in hospital E, 25 cases. Obviously, the cubicle arrangement in hospitals C and E were inadequate for preventing the spread of measles.

The surgical pediatric ward (3 east) is on the same floor as ward 3 west. Their entrances are opposite each other and are separated by a 10 foot (3 meter) corridor with an additional 8 feet (2.4 meters) of recess before each door. In ward 3 east there have been secondary cases of measles as well as of chickenpox and scarlet fever during the period of observation in spite of injections of pooled serum. This ward, therefore, may serve as a control, since, as already mentioned, the prophylactic measures were not carried out as recommended by us. The failure to prevent the spread of measles in hospital D was to be expected. For one thing, the measures were initiated at the height of the epidemic, which was too late for successful prophylaxis. The dosage of serum was inadequate and the repeatedly exposed children were not reinoculated.

Our original campaign was launched for the sole purpose of preventing secondary cases of contagious disease from appearing in the ward. This was accomplished by means of injections of pooled serum or plasma at the time of admission. We had no expectation, naturally, of influencing the incidence of primary cases. Consideration of the primary cases encountered in the various units disclosed that the

numbers in ward 3 west and hospital A were far less than those in hospitals with a comparable pediatric census. As indicated in table 2, only 6 primary cases in ward 3 west and 2 in hospital A were encountered in 4,737 admissions during the entire period. Considering the fact that the epidemic of measles in 1940-1941 was the most widespread in the history of the city of New York and that very few susceptible children escaped the disease, the low incidence of primary cases in ward 3 west and in hospital A is almost inconceivable. This is presumptive evidence that large amounts of pooled plasma or serum given on admission may abort the disease in patients who are in the second or third day of incubation. This impression was further substantiated when we compared these results with those of hospitals B, C, and E, where no serum was used. Of 11,280 children admitted, primary measles developed in 94. In the units where serum was injected one or two days after admission, the incidence of primary cases was considerably higher than in ward 3 west and hospital A.

There are a few points of clinical significance mentioned in the previous communications and alluded to in previous paragraphs which we wish to emphasize in the present report. We refer to dosage, time of inoculation and subsequent injection of serum for exposed children.

A sharp distinction should be made between serum obtained from a single person, who may possess a low antibody titer, and pooled serum, which contains adequate amounts of protective bodies. It is generally accepted that 5 to 6 cc. of convalescent measles serum is sufficient to confer passive immunity providing that administration is early enough in the period of incubation.

It is impossible with available laboratory procedures to measure the antibody titer of the serum of persons with most contagious diseases except diphtheria. Consequently, we do not know the optimal amount of pooled plasma or serum necessary to confer temporary immunity. Pooled serum is considered only one-fourth as potent as convalescent serum. To accomplish this purpose, we have been giving 30 cc. of pooled serum or plasma.

It is worth while considering another aspect of this question. The initial injection of serum protects the recipient for at least ten days to two weeks. If a primary case of contagion appears in the ward, an additional injection of serum is required for the patients who have not received an injection ten days prior to their exposure.

It is important to consider the time of inoculation in relation to the day of incubation. In the first two days of the incubation period, small amounts of serum will modify the disease, while large amounts may abort it. After the fifth day, even large amounts of serum rarely protect.

The practicability of a procedure of this kind depends largely on whether the technical difficulties of obtaining and storing serum can be overcome. An objection which deterred many hospitals from attempting to employ this form of prophylaxis was the fear that the parents would refuse to cooperate in giving the necessary quantity of blood. As a matter of fact, no difficulty was encountered from that source when we depended entirely on parental supply. The serum employed during the major part of the present observation was pooled, and we always managed to have a supply on hand. However, early in the course of the epidemic of measles it became apparent that our supply of serum was inadequate. It was necessary to recall the parents in order to obtain additional serum whenever a primary case of measles was discovered in the ward. The disadvantage of such a system is obvious. It was noted that a considerable amount of bank blood was being discarded on reaching the eighteen day time limit. Moreover, with the establishment of a plasma bank, the expiration date for bank blood has been shortened to seven days, when the plasma is siphoned off and pooled. Part of the plasma from this source has been made available for pediatric use, thereby saving us much labor and inconvenience.

VALUE OF THE PROCEDURE FOR GERMAN MEASLES

Investigation of the effect of human serum against rubella is totally lacking. This is probably due to the fact that this disease is mild and is rarely encountered in hospital wards. Unlike the rash of measles, the rash of this disease appears suddenly, without exhibiting any prodromal symptoms. When rubella develops in the ward there is great difficulty in combating its spread.

An opportunity presented itself to determine whether plasma acts in this disease as it does in other contagious diseases. About the middle of June 1941, the epidemic of measles was followed by a large number of cases of rubella. Because of the difficulty of recognizing the disease in its early stages, the condition was not discovered until a member of the resident staff and a ward attendant came down with it at the same time. Fortunately, all the children except 2 had recently been reinoculated with plasma because of the development of measles in a newly admitted patient. These 2 children had had definite measles prior to admission to the ward and therefore had not received plasma for eleven and thirteen weeks, respectively, after the initial inoculation on admission. Despite intimate contact and repeated exposure to rubella, the rest of the children in the ward escaped the disease. Which patient had the primary attack was never discovered. This clinical observation serves as presumptive evidence that pooled serum or plasma will prevent secondary cases of rubella.

COMMENT

Our experience during the past seven years disclosed that injections of human serum afforded complete protection against contagion. This measure withstood the severest test during the 1940-1941 epidemic of measles. Where similar but not identical measures were employed, the results were not at all successful. Such failures were not confined to cases in which only parental serum was used. The same results were obtained with injections of convalescent serum.

The fundamental point in an inquiry on this problem is whether there is anything essentially wrong with the prophylactic agent employed or whether the failure is due to the manner in which the procedure is carried out. The inconsistency of results requires elucidation. The explanation is that, although the procedure in general was seemingly the same, there were some breaks in the details of the technic, such as injection of inadequate amounts of serum, delay in inoculating the patients soon after admission and failure to reinoculate those who came in contact with contagion ten days after the initial injection.

It is such variable factors which account for the wide discrepancy in results. For instance, serum therapy is less likely to be successful if initiated after the onset or during an epidemic, since certain patients will have received the serum too late in the incubation period. It must be remembered that pediatric wards have a variable amount of communicable disease. At times there is a lull, and during other periods there is a marked increase in number, especially during epidemics. Prophylactic measures must therefore be carried out in a uniform manner at all times. In the field of prophylaxis, any deviation from the established procedure will cause the measure to fall short of its purpose.

In view of the increasing use which is being made of pooled serum and plasma from blood banks, it seems worth while to determine whether serum or plasma necessarily loses its potency in the course of time. The effect of aging on serum or plasma was considered in somewhat greater detail by Strumia, Wagner and Monaghan,[4] who showed that there was no appreciable diminution in the antibody content of plasma which had been kept for thirty-two days. Karelitz and Stempien [5] demonstrated that the antibodies for measles, scarlet fever and diphtheria in pooled plasma were only slightly diminished after one year of storage.

Despite the simplification of the procedure and the fact that the injected serum is rapidly absorbed without causing untoward effects, an objection is raised to the large amount which has to be injected.

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4. Strumia, M. M.; Wagner, J. A., and Monaghan, J. F.: Intravenous Use of Serum and Plasma, Fresh and Preserved, Ann. Surg. **111**:623 (April) 1940.

5. Karelitz, S., and Stempien, S. S.: Globulin Extract of Pooled Discarded Banked Blood as a Blanching Agent in Scarlet Fever, J. Infect. Dis. **66**:240 (May-June) 1940.

Because of its availability without any cost, we consider pooled plasma or serum to be the ideal prophylactic agent in hospital practice. The prophylactic agents now employed in private practice are specific convalescent serum and immune globulin. The former is used in cases of measles, scarlet fever and mumps with excellent results, but it is available only at widely scattered centers. Immune globulin, in our experience, has given a false sense of security and fairly severe local reactions.

Lyophile human serum and plasma are now being stored in large quantities for use in military emergencies. Our experience with pooled plasma would suggest that lyophile material could be employed in the home because of its convenience and availability even in remote districts. This material opens up a tremendous field for prophylaxis. This study will be the subject of a future communication.

CONCLUSIONS AND SUMMARY

The results of our method revealed that since 1934, including the 1940-1941 epidemic of measles, no secondary case of contagious disease occurred among the patients who received pooled serum or plasma.

Since secondary cases of contagious disease develop in pediatric wards, especially during epidemics, it is clear that prophylactic therapy by means of injection of 30 cc. of pooled serum or plasma should be administered to every patient over 3 months of age as a routine procedure on admission.

In order to duplicate our experience, it is necessary to pay scrupulous attention to the details of the method here described.

A long range view must be taken, so that inoculations are given routinely even though an epidemic is not in progress. Once contagion is widespread, it is practically impossible to influence the incidence of secondary cases.

A marked reduction in the number of primary cases was noted with the utilization of this method. This is presumptive evidence that pooled serum or plasma will abort measles if administered early in the incubation period.

Presumptive evidence is presented that pooled plasma is valuable as a prophylactic agent against rubella.

A constant supply of plasma is made available by utilization of hospital bank blood plasma.

On this basis, we advocate the adoption of this procedure by all hospitals.

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CHILDHOOD APPENDICITIS

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This is a statistical investigation of nonperforating and of perforating appendicitis, an attempt being made (1) to correlate the laboratory findings with the pathologic changes, morbidity and mortality, (2) to determine the incidence of chronic appendicitis in children and (3) to determine whether newer methods of treatment have produced a decreased morbidity and mortality in recent years.

TABLE 1.—*Age and Sex Distribution of 918 Children with Appendicitis*

(1934-1935)				(1936-1940)			
Ages	Males	Females	Total	Ages	Males	Females	Total
0-6	39	23	62	0-6	96	55	151
7-12	121	71	192	7-12	342	171	513
Total....	160	94	254	Total...	438	226	664

Total number of females	320
Per cent of females	35
Total number of males	598
Per cent of males	65

CLINICAL MATERIAL

The study was made on a total of 918 children with appendicitis, 12 years of age or younger, who were admitted to the Israel Zion Hospital, Brooklyn, from January 1934 through September 1940. In view of the changes in therapy produced by the advent of sulfanilamide and its derivatives, the patients are divided into two groups—those treated before and those treated after January 1936.

The incidence of appendicitis in infancy was relatively low, and the frequency increased proportionately throughout childhood into adolescence. During the period from January 1934 through December 1935, 254 children had a diagnosis of appendicitis made and were operated on. Of this number, 160 were males, of whom 39 were 6 years of age and younger and 121 were between 7 and 12 years inclusive; 94 were females, 23 below the age of 7 years and 71 from 7 to 12.

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There were 664 patients operated on during the 1936 to 1940 period. Of this group, 438 were males, 96 below the age of 7 and 342 between 7 and 12, and 226 were females, of whom 85 were younger than 7 and 171 were between 7 and 12. Of the total 918 patients, 598 (65 per cent) were males and 320 (35 per cent) were females.

Of the 918 patients in this series, 210 (22.9 per cent) had a perforated appendix on admission. Of this group, 192 had peritonitis and 18 appendical abscess. The group without perforation consisted of 708 patients, of whom 669 had simple acute appendicitis and 39 chronic or interval appendicitis.

The patients with chronic appendicitis in this series were those in whose cases the preoperative diagnosis was made from a definite history of previous recurrent mild attacks of appendicitis or of a previous nonoperatively treated appendical abscess and the postoperative diagnosis was based on histologic evidences of previous infection and scarring in the excised appendixes.

TABLE 2.—*Types of Appendicitis Investigated*

Total Number of Patients	918			
	Nonperforating		Perforating	
Group total	708		210	
Per cent	77.1		22.9	
	Acute	Chronic	Peritonitis	Appendical Abscess
No. of patients	669	39	192	18
Per cent of group total	94.5	5.5	91.4	8.6

ANALYSIS OF MATERIAL

Peritonitis.—No attempt has been made to distinguish between local, spreading and generalized peritonitis. Ladd [1] aptly stated that no surgeon really knows how diffused the process is unless he has done a very improper operation.

During the first period the condition went on to perforation with peritonitis in 24 per cent of the patients admitted, whereas this occurred in only 20 per cent of the patients during the second period. The lower incidence of peritonitis in the second period may be explained as being due to earlier diagnosis and operation.

A definite decrease in the case fatality rate was also noted in the two periods under discussion. In the first period the total case fatality rate was 8.9 per cent, and in the second period it was 4 per cent. Further analysis makes it apparent that the case fatality rate was highest in the age group 1 to 3 years (36.3 per cent in the first period and 4.6 per cent

1. Ladd, W. F.: Immediate or Deferred Surgery for General Peritonitis Associated with Appendicitis in Children, New England J. Med. **219**:329, 1938.

in the second). On the surface this appears to be a remarkable decrease. However, the number of patients in this age group is too small to warrant a definite conclusion. When the case fatality rates in the two periods

TABLE 3.—*Age and Sex Distribution of Patients with Peritonitis and Mortality*

(1934-1935)

Discharged Alive				Died			
Ages	Males	Females	Total	Ages	Males	Females	Total
0-3	2	5	7	0-3	2	2	4
4-6	7	7	14	4-6	0	0	0
7-9	8	7	15	7-9	0	1	1
10-12	15	5	20	10-12	0	0	0
Total.....	32	24	56	Total.....	2	3	5

Number of patients with peritonitis..... 61
Number of patients with appendicitis..... 254

Per Cent
Incidence of Peritonitis..... 24.0
Case fatality rate of peritonitis..... 8.9

(1936-1940)

Discharged Alive				Died			
Ages	Males	Females	Total	Ages	Males	Females	Total
0-3	15	6	21	0-3	1	0	1
4-6	19	12	31	4-6	0	2	2
7-9	22	16	38	7-9	1	1	2
10-12	23	13	36	10-12	0	0	0
Total.....	79	47	126	Total.....	2	3	5

Number of patients with peritonitis..... 131
Number of patients with appendicitis..... 664

Per Cent
Incidence of peritonitis..... 20.0
Case fatality rate of peritonitis..... 4.0

TABLE 4.—*Age Distribution of Patients with Appendical Abscess*

(1934-1935)		(1936-1940)	
Ages	Number of Patients	Ages	Number of Patients
0-3	0	0-3	3
4-6	1	4-6	3
7-9	4	7-9	4
10-12	1	10-12	2
Total.....	6		12

Number of patients with appendical abscess..... 18
Number of patients with peritonitis..... 192
Number of patients with perforating appendicitis..... 210

Per Cent
Total incidence of appendical abscess..... 2.0
Proportion of appendical abscess to perforating appendicitis..... 8.6

for all the age groups are considered, there is a significant decrease in the latter period. This decrease may be explained by the fact that from 1936 sulfanilamide was given orally or parenterally to all patients with cases of peritonitis and that in 1940 it was also introduced directly into the peritoneal cavity through the operative wound.

Appendical Abscess.—Appendical abscess occurred in 2.0 per cent of the patients in this series. A total of 210 of the patients with appendicitis had perforation on admission. For 8.6 per cent of these a diagnosis of appendical abscess was made. In the 1934 and 1935 period, 2.4 per cent of all the patients fell into this group, and during 1936 to 1940, 1.8 per cent.

Hematopathology.—The white blood cell counts obtained at the time of the patient's admission to the hospital revealed a definite relation to the incidence of nonperforating and perforating appendicitis. When the patients are divided into six groups according to their white blood cell counts (0 to 5,000; 6,000 to 10,000; 11,000 to 15,000; 16,000 to 20,000; 21,000 to 30,000, and 31,000 plus), the percentage of poly-

TABLE 5.—*Relation of Leukocyte Count and Temperature to Appendicitis and Peritonitis*

WBC Groupings in Thousands	Average Per Cent of Polys.	Average Temp.	Total No. of Patients	Number Without Peritonitis	Number With Peritonitis	Per Cent With Peritonitis	Number With Appendical Abscess	Per Cent With Abscess
0-5	72.0	100.2	8	6	2	25.0	1	12.5
6-10	73.6	100.4	136	125	9	6.6	3	2.2
11-15	80.5	100.5	287	230	57	20.0	5	1.7
16-20	84.0	101.0	285	219	66	23.1	4	1.4
21-30	85.7	101.4	150	98	52	34.6	5	3.3
31-plus	88.0	101.4	13	5	8	61.5	1	7.6

Total number of patients..... 879*
Total number of patients without peritonitis..... 687
Total number of patients with peritonitis..... 192

* Exclusive of 39 patients with chronic appendicitis.

morphonuclear leukocytes and the temperature on admission increase almost proportionately with the increasing leukocyte count. In like manner, the incidence of peritonitis increases with the leukocyte count (except in the 0 to 5,000 group, in which the sample of 2 patients with peritonitis among only 8 patients with appendicitis is too small to be of any significant value). This increase goes from 6.6 per cent in the 6,000 to 10,000 group to 20 per cent in the 11,000 to 15,000 group, to 23.1 per cent in the 16,000 to 20,000 group, to 34.6 per cent in the 21,000 to 30,000 group and up to 61.5 per cent in the 31,000 plus group. The largest actual numbers of patients with peritonitis had blood counts from 11,000 to 15,000, from 16,000 to 20,000 and from 21,000 to 30,000 (57, 66 and 52 patients respectively).

There was no related increase of the incidence of appendical abscess with the increasing leukocyte counts. The largest number of patients with appendicitis without peritonitis had blood counts from 6,000 to

20,000 (578 patients); lesser numbers had counts from 0 to 5,000 and from 21,000 to 30,000 (6 and 98 patients respectively).

The severity of the disease may be forecast to a large extent by the white blood cell count made at the time of the patient's admission. A definite relation is found between the leukocyte counts and the morbidity, as determined by the duration of the patients' stay in the hospital. In the group with counts from 0 to 5,000 the average stay in the hospital was nine and five-tenths days. This duration gradually increased with the leukocytosis, up to eighteen days for the 31,000 plus group.

TABLE 6.—*Relation of Leukocyte Count to Morbidity and Mortality*

WBC Groupings in Thousands	Total No. of Patients	No. Died	Per Cent Died	Average No. Hosp. Days for All Patients
0-5	8	0	0.0	9.5
6-10	136	2	1.5	11.8
11-15	287	3	1.1	11.9
16-20	285	4	1.4	12.2
21-30	150	3	2.0	12.6
31-plus	13	0	0.0	18.0
Total number of patients				879*
Total number of deaths				12

* Excluding 39 patients with chronic appendicitis.

TABLE 7.—*Relation of Leukocyte–Pulse Rate Index* to Mortality and Morbidity*

Index	No. of Patients with Peritonitis	Peritonitis Per Cent Cases	Extreme Morbidity†		Deaths	
			No. of Patients	Per Cent	Number	Per Cent
Over 7	77	37	45	58	8	10.4
7 and less	133	63	44	33	2	1.5
Total—210 patients with peritonitis.						

* Leukocyte-pulse rate index = pulse rate/leukocytes in thousands.
† Determined by a hospital stay of fifteen days or over.

The mortality showed no proportionate relation to the leukocyte count. There were no deaths in the 0 to 5,000 and 31,000 plus groups. Death rates of 1.5, 1.1, 1.4 and 2 per cent respectively occurred in the remaining groups. Peritonitis was seen most frequently in the latter groups, and 83 per cent of the deaths were due to peritonitis. No deaths occurred in the patients with appendical abscess.

According to recent observations,[2] a leukocyte–pulse rate index, determined by the ratio of the admission pulse rate to the admission white blood cell count expressed in thousands, is of value in prognosing the severity of appendical peritonitis in terms of mortality and morbidity. In this series of cases a critical index of 7 was determined by averaging

2. Rogers, H.: Personal communication to the author.

the average index for the patients who died and those who remained in the hospital over fifteen days with the average for the patients who were hospitalized under fifteen days.

Of the 210 patients with peritonitis in this series, 77 had indexes greater than 7 and 133 indexes of 7 or less. Of the patients with the higher indexes, 10.4 per cent died (80 per cent of the total deaths of patients with peritonitis), whereas only 1.5 per cent died in the group

TABLE 8.—*Illnesses Preceding Attacks of Appendicitis*

Illnesses	Nonperforating Appendicitis	Perforating Appendicitis
Infection of upper respiratory tract	12	7*
Tonsillitis	5	0
Cervical adenitis	1	0
Bronchitis	1	0
Pneumonia	1	0
Cellulitis of hand	1	0
Chickenpox	2	0
Measles	1	0
Stomatitis	0	1
Nephritis	1	0
Rheumatic heart disease	1	0
Diabetes	1	0
Froehlich's syndrome	2	0
Total number of patients	29	8

* One died.

TABLE 9.—*Previous Attacks of Abdominal Pain*

	Nonperforating Appendicitis		Perforating Appendicitis
	Acute	Chronic	
Number with pain	71	14	9
Number without pain	598	25	201
Total number of patients	669	39	210
Per cent of patients with previous attacks of pain	10.6	35.9	4.3

with the lower indexes. There was also a greater morbidity in the first group.

Previous Illness.—Only 37 of the 918 patients gave a history of preceding illnesses. Of these illnesses, the common diseases of the respiratory tract were the most frequent and occurred immediately previous to simple acute appendicitis in 19 cases and to peritonitis in 7 cases.

Previous Attacks of Abdominal Pain.—A history of previous recurring attacks of abdominal cramps, either generalized or localized to the right lower quadrant, was obtained from 10.2 per cent (94) of the patients in this series. Of those with simple acute appendicitis, 10.6

per cent had this type of history; of those with peritonitis, 4.3 per cent, and of those with chronic or interval appendicitis, 35.9 per cent. From these statistics it is apparent that a history of this type of previous pain should lead one to suspect the presence of chronic appendicitis.

Fecaliths.—Appendical fecaliths were found in 157 patients, of whom 106 had appendicitis without perforation, 47 had peritonitis and 4 had appendical abscess. It is interesting to note the presence of fecaliths in all of the 3 patients with helminthiasis and in the 1 patient with carcinoid of the appendix in this series. Patients with fecaliths almost invariably

TABLE 10.—*Relation of Appendical Fecaliths to Types of Appendicitis*

	Nonperforating Appendicitis	Perforating Appendicitis	
		Peritonitis	Abscess
Presence of fecaliths	106*	47	4
Absence of fecaliths	602	145	14
Total number of patients	708	192	18
Per cent with fecaliths	13.5	24.0	22.0

* In 3 patients associated with helminthiasis; in 1, carcinoid; in 4, with chronic appendicitis.

TABLE 11.—*Patients with Appendicitis Who Had Drainage Performed*

	(1934-1935)		(1936-1940)	
	Nonperforating	Perforating	Nonperforating	Perforating
Drainage	36	66	100	134
No drainage	151	1	421	9*
Total number of patients	187	67	521	143
Per cent with drainage	19.3	98.5	19.2	93.7

* Including 2 patients with appendical abscess treated expectantly and 1 with appendical abscess treated with only incision and drainage.

had the typical Murphy syndrome of appendicitis (epigastric pain, followed by nausea and vomiting, pain in the right lower quadrant of the abdomen, moderate fever and leukocytosis), and in them the disease pursued a more fulminating course, in relation to the intensity of the pathologic changes, than it did in the others of the group. Only 13.5 per cent of the patients with simple appendicitis had fecaliths, as against 24 per cent of the patients with peritonitis and 22 per cent of those with appendical abscess.

Treatment.—Appendectomies were performed on all the patients in this series, with the exception of 3 with appendical abscess and 1 with peritonitis. About one third of the patients (336) had drainage performed. During the 1934 and 1935 period, 19.3 per cent (36) of the

patients without perforation and 98.5 per cent (66) of these with perforation had drains inserted at operation. Approximately the same percentage of patients had drainage during the 1936 to 1940 period. The hospital stay for patients without perforation or drainage was about four to five days less than for the patients who had drains inserted. The number of patients with peritonitis who did not have drainage (7) was too small to warrant definite conclusions.

Postoperative Complications.—Postoperative complications occurred in 3.6 per cent of the patients in the series. They were present in only 1.7 per cent (13) of the group without perforation. However, the

TABLE 12.—*Postoperative Complications*

Complications	Nonperforating Appendicitis	Perforating Appendicitis
Pneumonia	1	2
Atelectasis	1	2
Pulmonary edema	0	1
Empyema	1	0
Encephalitis	0	1
Mastoiditis	1	0
Pyelitis	1	0
Uremia	1	0
Pelvic abscess	3	9
Subphrenic abscess	0	1
Pyelophlebitis	0	1
Fecal fistula	0	1
Peritonitis from stump blow-out	1	0
Axillary abscess	0	1
Abdominal wall abscess	2	0
Intestinal obstruction	0	1
Thrombophlebitis	1	0
Total no. of patients with complications	13	20
Total no. of patients in series	708	210
Incidence of complications	1.8%	9.5%
Total incidence of complications in 918 patients with appendicitis		3.6%

incidence of complications rose to 9 per cent (20) in the patients with perforation, the most frequent one being pelvic abscess (present in 9 patients). Despite the fact that high ligation of the appendical vein was performed on all patients with gangrenous appendicitis who had chills before the operation, complicating pyelophlebitis occurred in 1 instance.

Mortality.—The total mortality in this series was 1.3 per cent (12 deaths). In the first time period there were 5 deaths (2 per cent mortality), and in the second period 7 patients died (1.1 per cent). This decrease in total death rate is associated with the decrease in the death rate for patients with peritonitis from 8.9 to 4.0 per cent. Only 2 of the deaths occurred in the group without perforation. There were no deaths in the 1940 period of this study, and only 1 in each of the years 1938 and 1939. A detailed study of the 12 fatal cases is presented in table 13.

TABLE 13.—*Data on Patients Who Died*

Year	Age	Sex	Preoperative Diagnosis	Treatment	Duration Preop.	Duration Postop.	Operative Diagnosis	Pathologic Diagnosis
1934	3	M	Acute perforating gangrenous appendicitis; peritonitis	Appendectomy and drainage	3 days	1 day	Acute perforating gangrenous appendicitis; peritonitis	Perforating appendicitis; fecalith; peritonitis; intestinal obstruction; pulmonary congestion; splenitis
	7	F	Acute gangrenous appendicitis; peritonitis; pharyngitis	Appendectomy	5 hours	2 days	Acute suppurative appendicitis	Acute appendicitis; diffuse peritonitis; sepsis
1935	3	F	Acute appendicitis	Appendectomy and drainage	4 days	2 days	Acute suppurative appendicitis; peritonitis	Perforating gangrenous appendicitis; peritonitis
	1½	M	Acute perforating gangrenous appendicitis; peritonitis	Appendectomy and drainage	30 hours	2 days	Acute perforating gangrenous appendicitis; peritonitis	Perforating gangrenous appendicitis; fecalith; peritonitis
	3	F	Acute perforating appendicitis; peritonitis	Appendectomy and drainage	3 days	3 days	Acute perforating gangrenous appendicitis; peritonitis	Perforating gangrenous; appendicitis; fecalith; peritonitis
1936	4	F	Acute gangrenous appendicitis; peritonitis	Appendectomy and drainage	1 day	5 days	Acute perforating gangrenous appendicitis; peritonitis	Acute ulcerative appendicitis; lobar pneumonia (left lung)
	5½	F	Acute appendicitis	Appendectomy	1 day	5 days	Acute appendicitis	Catarrhal appendicitis; lobar pneumonia (right lung)
	9	M	Acute appendicitis	Appendectomy	2 days	12 days	Acute appendicitis	Subacute appendicitis; pulmonary embolus
1937	7½	M	Peritonitis	Appendectomy and drainage	9 hours	3 days	Acute appendicitis; peritonitis	Acute suppurative appendicitis; peritonitis; sepsis; encephalitis
	8	F	Acute gangrenous appendicitis; peritonitis	Appendectomy and drainage	12 hours	2 days	Acute gangrenous appendicitis; peritonitis	Acute appendicitis; peritonitis; pulmonary edema
1938	3	M	Acute perforating appendicitis; peritonitis	Appendectomy and drainage	3 days	3 days	Acute perforating gangrenous appendicitis; peritonitis	Acute perforating appendicitis; fecalith
1939	4	F	Acute appendicitis	Appendectomy and drainage	7 days	2 days	Acute perforating appendicitis; peritonitis	Acute perforating appendicitis; peritonitis
1940	None							

COMMENT

The general picture of appendicitis in children is similar to that in adults, except that the course of the disease in children is more rapid, according to most observers.[3] Approximately 20 per cent of adults with appendicitis have perforation; in half of these peritonitis develops and in half an abscess forms. It is interesting to note that the incidence of perforation is approximately the same in children and in adults. In this series of 918 children with appendicitis, 22.8 per cent had perforation. In 91.4 per cent of these peritonitis developed, and in the remaining 8.6 per cent, appendical abscess. Ladd stated that the length of the omentum relative to the size of the abdominal cavity is less in childhood than in later life, and for that reason localization of an inflammatory process in the peritoneal cavity takes place less frequently.

Atypical symptoms and signs, combined with difficulties of verbal expression,[4] often confuse the picture in cases of appendicitis in childhood. The Murphy syndrome is almost pathognomonic of appendicitis, but it does not occur often enough in children, except in those with obstructive appendical fecaliths, to warrant its absence ruling out the diagnosis of appendicitis.

Although the elevation of the white blood cell count is well recognized as an aid in diagnosing appendicitis, it is my contention that more attention should be paid to the extent of the leukocytosis as a help in determining the presence of peritonitis. Over 80 per cent of the patients with appendicitis had blood counts between 11,000 and 30,000, with an associated proportionate increase of polymorphonuclear leukocytes to between 80.5 and 88 per cent and a parallel increase in temperature to between 100.5 and 101.4 F. The higher the white blood cell count, the greater should be the suspicion of the existence of peritonitis. In the patients with a blood count range of 6,000 to 10,000 there was only a 6.6 per cent incidence of peritonitis, whereas, on the other hand, 61.5 per cent of the patients with leukocyte counts of over 31,000 had peritonitis. However, the degree of leukocytosis does not bear a similar relation to the incidence of appendical abscess. This may be explained by the observation that the abscesses are in various stages of being walled off on admission.

The degree of leukocytosis is an aid in prognosing morbidity (as determined by the length of hospitalization). There was a proportional

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3. (*a*) Deaver, J. M., and Martin, A. G.: Acute Appendicitis in Children, Surg., Gynec. & Obst. **66**:962, 1938. (*b*) Barrow, W., and Ochsner, A.: Treatment of Appendical Peritonitis, J. A. M. A. **115**:1246 (Oct. 12) 1940.

4. Scham, M., and Moss, A. J.: Early Diagnosis of Acute Appendicitis in the Pre-School Child, Journal-Lancet **60**:444, 1940.

increase from nine and five-tenths days' stay associated with blood counts between 0 and 5,000 up to eighteen and five-tenths days with blood counts over 30,000.

The leukocyte–pulse rate index appears to be a useful aid in prognosing the degree of resistance in those patients with peritonitis; it may also serve as a criterion for the type of treatment to be instituted, including the intensity of therapy with sulfanilamide or one of its derivatives.

The fulminating course of childhood appendicitis may be the explanation of the low incidence (4.2 per cent) of chronic appendicitis in this series, as contrasted with the high incidence of acute appendicitis. Since children have a low resistance to intra-abdominal infections,[5] spontaneous healing of an appendical infection, with resultant cicatrization and deformity of the appendix, rarely occurs. Practically all of the children with chronic appendicitis had previous subclinical attacks, 39.5 per cent with recurring abdominal cramps, the appendix at operation showing moderate to severe scarring.

For this series of children the treatment of appendicitis, as a whole, consisted of immediate appendectomy on all the patients who did not have complications and on all those with peritonitis, with a single exception. This patient was treated expectantly because a tendency toward pelvic localization was apparent. Ten days after admission an abscess formed; this was incised and drained through the rectum. An interval appendectomy was performed five months later. In addition to appendectomy, 98.3 per cent of the patients with peritonitis had drains inserted. An attempt was made in all cases more or less to restore the fluid balance before operation. The approach to treatment that was used roughly paralleled that advised by Deaver,[3a] with the addition that since 1936 sulfanilamide therapy orally and/or parenterally was instituted for the patients with perforating appendicitis. Since 1940 sulfanilamide has also been used locally, poured directly into the abdominal cavity through the operative wound.

As a general routine a patient with an appendical abscess with a history of three days' duration or longer and a palpable mass felt abdominally or rectally is not operated on unless he shows signs of developing peritonitis. Fifteen of the 18 patients with appendical abscess in this series underwent appendectomy and drainage within three or four days after admission, when it became apparent that the infection was spreading. Of the remaining 3, 2 were treated expectantly with appendectomy performed three to six months later, and 1 patient, after rectal incision and drainage of his abscess, underwent appendectomy after a six month

5. Jones, R., and Menefee, E. E.: Acute Appendicitis in Children, Am. J. Surg. **37**:446, 1937.

interval. Whenever possible, incision and drainage are performed through the rectum as a primary procedure for a pelvic appendical abscess and as a secondary procedure for a pelvic abscess resulting from a localizing peritonitis. In the 1934 and 1935 period the average stay in the hospital of the appendectomized patients who had had abscess was twenty-eight days, in contrast to only eighteen and five-tenths days in the 1936 to 1940 period. This remarkable decrease in morbidity was apparently due to the use of sulfanilamide. The nonappendectomized patients remained in the hospital for nineteen days. From this small series it is worthy to note that when sulfanilamide is used as an adjunct to operation the morbidity of appendical abscess treated by appendectomy is the same as that experienced with the nonoperative method. Most surgeons [6] and pediatricians believe the latter to be safer. According to Potts,[7] it is essential in determining the proper treatment of an appendical mass to picture in each case the pathologic changes occurring. He recommended the conservative treatment, if possible, with four to seven days allowed after the onset to permit the mass to become walled off. However, if the mass continues to enlarge during these several days, symptoms of intestinal obstruction persist, the fever and leukocytosis increase and the child looks clinically worse, then operation is indicated. If the conservative, or expectant, method is adhered to, an appendectomy should be performed two to three months later.

Throughout the country, the mortality of nonperforating appendicitis, according to Thompson,[8] is anywhere from less than 1 per cent up to 5 per cent, and when extension beyond the appendix has occurred the mortality for the resulting peritonitis is between 10 and 15 per cent. Appendical abscess has a death rate of about 2 per cent, according to Bower.[9] In our series, the mortality for all the children with appendicitis was 1.3 per cent. In the group without perforation the death rate was 0.2 per cent, and in the patients who had perforation with peritonitis there was a 5.2 per cent mortality during the entire period investigated and no deaths from appendical abscess. The younger the age group, the higher is the mortality.[10] The mortality of the children with peritonitis

6. Ladd, W. F.: Children's Surgery, New England J. Med. **220**:564, 1939. Adams, J. M., and Bancroft, P. M.: Conservative Management of Appendiceal Peritonitis in Children, J. Pediat. **12**:298, 1938. Deaver.[3a]

7. Potts, W. J.: Acute Appendicitis in Children, Am. J. Dis. Child. **55**:511 (March) 1938.

8. Thompson, W. H.: Appendicitis in Children, J. Tennessee M. A. **32**:232, 1939.

9. Bower, J. O.: Spreading Peritonitis Complicating Appendicitis, Minnesota Med. **23**:755, 1940.

10. Collins, A. N.: Acute Appendicitis in Children Under Twelve, Minnesota Med. **20**:583, 1937.

below 4 years of age was 17.8 per cent, as contrasted with the 5.2 per cent for all the age groups. Of the 12 deaths in this series, 10 (83 per cent) were due to peritonitis. The death rate of 8.9 per cent for the patients with peritonitis during 1934 and 1935 fell to 4 per cent during the 1936 to 1940 interval, with no mortality in 1940. This decrease in mortality may be explained by improved preoperative and postoperative care, prompt parenteral administration of fluids, use of the Miller-Abbott tube in cases of intestinal obstruction, and, of special importance, oral, parenteral and (during 1940) local use of sulfanilamide. These observations are similar to those made by Mueller [11] and Thompson.[12]

CONCLUSIONS

A clinical investigation of appendicitis in 918 children 12 years of age and younger was made.

1. A definite correlation of diagnostic and prognostic importance is shown between the degree of leukocytosis (with its associated proportional rise of polymorphonuclear leukocytes and temperature) and the incidence of peritonitis in appendicitis. No relation was found between the leukocytosis and the incidence of appendical abscess. The leukocyte-pulse rate index is shown to be an aid in determining the degree of resistance in patients with peritonitis.

2. Chronic appendicitis as a definite clinical entity is comparatively unusual in childhood and occurs most frequently after a series of subclinical attacks of appendicitis.

3. The oral and parenteral administration of sulfanilamide to patients with peritonitis apparently causes a marked reduction in the mortality and morbidity of perforating appendicitis. During 1940, when, in addition, sulfanilamide crystals were poured directly into the abdominal cavity through the operative incision, the mortality was zero.

Stark General Hospital.

11. Mueller, R. S.: Use of Powdered Crystalline Sulfanilamide in Surgery, Correspondence, J. A. M. A. **116**:329 (Jan. 25) 1941.

12. Thompson, J. E.; Brabson, J. A., and Walker, J. M.: The Intra-Abdominal Application of Sulfanilamide in Acute Appendicitis, Surg., Gynec. & Obst. **72**:722, 1941.

BLOOD VOLUME OF NEWBORN INFANT IN RELATION TO EARLY AND LATE CLAMPING OF UMBILICAL CORD

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The total blood volume of normal newborn infants was estimated by Schücking [1] in 1879. Since that time seven investigations have been made, but in only four (Lucas and Dearing [2]; Bakwin and Rivkin [3]; Robinow and Hamilton [4]; Brines, Gibson and Kunkel [5]) were infants studied during the first month of life. Results of these studies and of those of Schücking are summarized in table 1. Values for plasma volume and for total blood volume of the newborn cannot be considered to have been firmly established, for two reasons. Except in the work of Brines, Gibson and Kunkel, the most accurate method of estimating volume was not employed. Furthermore, only Schücking took into account the addition of placental blood to the circulation of the newborn infant when clamping the umbilical cord is delayed, although Robinow and Hamilton (1940) recognized this possibility and discussed it in their article.

Some of the errors inherent in older methods of estimating blood volume have been overcome by Gibson and Evans,[6] who introduced a

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1. Schücking, A.: Berl. klin. Wchnschr. **16**:581 (Sept. 29) 1879.

2. Lucas, W. P., and Dearing, B. F.: Blood Volume in Infants Estimated by the Vital Dye Method, Am. J. Dis. Child. **21**:96 (Jan.) 1921.

3. Bakwin, H., and Rivkin, H.: Estimation of Volume of Blood in Normal Infants and in Infants with Severe Malnutrition, Am. J. Dis. Child. **27**:340 (April) 1924.

4. Robinow, M., and Hamilton, W. F.: Blood Volume and Extracellular Fluid Volume of Infants and Children: Studies with Improved Dye Micromethod for Determination of Blood Volume, Am. J. Dis. Child. **60**:827 (Oct.) 1940.

5. Brines, J. K.; Gibson, J. G., and Kunkel, P.: J. Pediat. **18**:447 (April) 1941.

6. Gibson, J. G., and Evans, W. A.: J. Clin. Investigation **16**:301 (May) 1937.

technic employing the dye T 1824 (Evans blue) and the Evelyn photoelectric colorimeter.

Haselhorst and Allmeling [7] proved that much of the blood in the placental circuit of the fetus flows into the infant at birth when the umbilical cord is not clamped immediately. They recorded accurately the increasing weights of infants during the inflow of placental blood. DeMarsh, Alt, Windle and Hillis [8] found that the red corpuscle counts and hemoglobin values were significantly higher during the first week of life in infants receiving the placental blood at birth than in those deprived of this blood. A higher reticulocyte count was found in the latter group. The present experiments were undertaken to determine the relation between time of clamping the cord and total blood volume of the newborn infant.

TABLE 1.—*Average Blood Volume of Human Infants During the First Month as Reported in the Literature*

Investigators	No. of Infants	Age Range, Days	Cord Clamped	Method *	Weight, Gm.	Hematocrit Reading, %	Plasma, Cc.	Total Blood	
								Cc.	% of Body Weight
Schücking [1]	2	<1	Early	Per.	3,203	....	...	207	6.5
	3	<1	Late	Per.	3,798	....	...	427	11.0
Lucas and Dearing [2]	30	<1 to 15	?	B.V.R.	3,272	58.1	194	487	14.9
Bakwin and Rivkin [3]	1	12	?	B.V.R.	2,400	64	91	253	10.5
Robinow and Hamilton [4]	20	<1 to 10	?	B.V.R.	.....	52.7	...	...	9.8
Brines, Gibson and Kunkel [5]	4	7 to 21	?	E.B.	3,260	44.4	156	279	8.6

* Per. indicates perfusion; B.V.R., brilliant vital red dye; E.B., Evans blue.

PROCEDURE AND SOURCES OF ERROR

We chose to use Gibson and Evans' colorimetric blood volume method. Readings were taken with the micro attachment of the Evelyn photoelectric colorimeter, the same plunger (0.1 cc.) and glass cell being used for all determinations. The dye T 1824 was of Eastman Kodak Company lot no. 3873. Its K value was determined by the method of Gibson and Evelyn [9] and found to be the same as theirs. The total quantity of dye needed for all experiments was put into solution in triple-distilled water, and 1.5 cc. quantities were sealed in 5 cc. ampules. Each cubic

7. Haselhorst, G., and Allmeling, A.: Ztschr. f. Geburtsh. u. Gynäk. **98**:103, 1930.

8. DeMarsh, Q. B.; Alt, H. L.; Windle, W. F., and Hillis, D. S.: Effect of Depriving Infant of Its Placental Blood on Blood Picture During First Week of Life, J. A. M. A. **116**:2568 (June 7) 1941.

9. Gibson, J. G., and Evelyn, K. A.: J. Clin. Investigation **17**:153 (March) 1938.

centimeter of this solution contained exactly 1.5 mg. of the dye. The following formula served to calculate plasma and total blood volume:

$$\text{Plasma volume} = \frac{M\ K}{L}$$

M is the amount of dye injected into the blood stream; K, the constant for the dye, and L, 2—the logarithm of the galvanometer reading of the recovered serum.

$$\text{Blood volume} = \frac{\text{plasma volume}}{100 - \text{hematocrit reading}} \times 100$$

Because it was advisable to make as few repeated punctures as possible in newborn infants, we did not construct individual curves recording the disappearance of the dye from the circulation. Six minutes was allowed for thorough mixing with the blood. This was the optimum mixing time reported by Barcroft and Kennedy [10] in sheep fetuses near term. A 2 per cent correction was added to each total blood volume to compensate for excretion of the dye (Kennedy and Millikan [11]).

The technic of estimation of blood volume as applied to newborn infants was as follows: The region of the anterior fontanel was shaved and cleansed with alcohol. With the infant held in the upright position by a nurse, a 21 gage, ¼ inch (0.6 cm.) needle on a syringe was introduced into the superior sagittal sinus, and approximately 3 cc. of blood was withdrawn. The hematocrit reading of this blood was determined by centrifuging in a Wintrobe tube at 2,900 revolutions per minute for thirty minutes. Serum [12] obtained from a clotted specimen served for a blank in adjusting the galvanometer dial of the colorimeter. With the needle still in the sinus, 1.5 mg. of the dye was slowly introduced from a calibrated tuberculin syringe. Residual dye was flushed from the syringe by drawing blood back and forth until the blood was visibly free from blue color before withdrawing the needle. After six minutes, another needle was introduced into the sinus and 2 cc. of blood removed. This blood was allowed to clot to provide dye-containing serum for the colorimetric procedure.

In the cases of a number of infants the operative technic was poor and the results were discarded from our series. A large error in the final volume estimation could have resulted from failure to introduce all of the dye solution into the circulation. Every effort was made to prevent it from escaping into surrounding tissues. In some experiments we failed to obtain a free flow of blood into the syringe to flush out the residual dye. The results of these experiments were also discarded. There are several high values among our results (table 2), especially those for infants 10 and 18 D, which suggest that we may have failed to obtain complete mixture of the dye with the blood. We assumed that the circulation rate in the human infant is similar to that in the sheep; this may not be true. Furthermore, we assumed that the slight trauma induced by the first puncture would not jeopardize results obtained from blood withdrawn after a second puncture at the same location. A number of minor sources of error appeared, but it was hoped that most errors would cancel each other. Slight variations in reading the calibrations on the dye syringe and the hematocrit tubes were unavoidable. Hemolysis of blood before centrifuging was encountered in 1 instance, and a correction

10. Barcroft, J., and Kennedy, J. A.: J. Physiol. **95**:173 (Feb. 14) 1939.

11. Kennedy, J. A., and Millikan, G. A.: J. Physiol. **93**:276 (Aug. 15) 1938.

12. Gregerson, Gibson and Stead (Am. J. Physiol. **113**:54 [Sept.] 1935) have shown that serum is preferable to plasma for use with the colorimeter.

was made for this (Gibson and Evelyn [9]). It is probable that final averages for plasma and blood volumes tend to be slightly higher rather than lower than true values.

Either one or two estimations of blood volume were made on 35 newborn infants. All deliveries were conducted without narcosis and without general anesthesia. In 18 of these infants the umbilical cord was clamped immediately after birth. To be certain that infants in this group did not receive an appreciable transfusion of blood, the placental blood was allowed to run out of the cord into graduated cylinders. Infants were accepted for the series only when 90 cc. or more of blood could be recovered from the vessels of the placental end of the severed cord. In the other 17 infants, the cord was clamped only after the placenta had separated from the uterus and had begun to descend into the vagina. By this time the infant had received most of its placental blood, for we were unable to collect any blood from the severed ends of the cord.

Estimations of blood volume were made fifteen minutes to three hours after birth and/or on the third day of life. Originally we conducted experiments on the third day only, but later we added estimations on the day of birth, to serve as checks on the third day values and to give information on changes in volume during the early neonatal period, especially in relation to loss of weight.

RESULTS

Results are recorded in table 2. For the infants failing to receive their placental blood, average hematocrit values of 53 per cent on the first and 51 per cent on the third day were practically the same as the average hematocrit reading of the umbilical cord blood, which was 51 per cent. For the infants whose placental blood had been allowed to pass into their circulation at birth, hematocrit values were higher, averaging 61 per cent on the first and 60 per cent on the third day. Reliability of the differences between values for the infants with immediate and those with delayed clamping of the cord, calculated by the formula $R = \frac{D}{\sigma \text{ dif.}}$, in which D is the true difference, and σ dif. $= \frac{\sigma}{\sqrt{n}}$, n being the number of cases, was 6.6 for the first day and 6.0 for the third, indicating a high degree of significance from the statistical standpoint.

Plasma volume was remarkably constant in both groups, averages varying only a few cubic centimeters from a mean of 139 cc. When expressed as a function of body weight, however, it appeared to be slightly higher on the third than on the first day. The differences, undoubtedly related to losses of weight on the third day, were not statistically significant.

The total volume of blood was similar on the first and the third day, averaging 364 and 360 cc. respectively in the infants receiving their placental blood and 313 and 294 cc. in those deprived of it. The higher average values in the former group suggest a relation to the rise in the hematocrit reading. Statistically the differences, especially that between the third day averages, are significant (reliability = 2.2 for first day

difference, and 3.5 for third day difference). When the total blood volume was expressed as a function of body weight, it was found to average 9.4 per cent on the first and 9.6 per cent on the third day in the

TABLE 2.—*Blood Volume in Relation to Early and Late Clamping of the Umbilical Cord*

					First Day						Third Day					
			Placental Blood				Plasma		Total Blood				Plasma		Total Blood	
Infant No.*	Race	Sex	Vol., Cc.	Ht.,† %	Wt., Gm.	Ht.,† %	Cc.	% of Wt.	Cc.	% of Wt.	Wt., Gm.	Ht.,† %	Cc.	% of Wt.	Cc.	% of Wt.
Cord Clamped Early																
10	W	F	100	50	.....	..	...	...	...	....	2,655	50	178	6.7	368	13.8
11	W	M	115	54	.....	..	...	...	...	....	3,210	52	131	4.1	281	8.8
14	C	M	120	50	.....	..	...	...	...	....	3,152	40	151	4.8	261	8.2
15	C	M	90	54	.....	..	...	...	...	....	2,798	56	122	4.4	289	10.3
16	W	F	95	50	.....	..	...	...	...	....	2,731	43	164	6.0	317	11.5
17	C	M	100	53	.....	..	...	...	...	....	3,052	56	115	3.8	270	8.9
18	C	F	135	56	3,386	56	121	3.6	284	8.4	3,130	56	138	4.4	324	10.3
19	C	M	90	38	.....	..	...	...	...	....	3,152	42	140	4.4	251	8.0
20	C	F	95	..	2,860	56	140	4.9	329	11.4	2,626	56	108	4.1	254	9.6
21	C	F	115	55	3,181	55	178	5.6	408	12.8	3,031	54	108	3.6	243	8.0
22	C	F	105	..	3,436	51	178	5.2	374	10.8	3,266	48	140	4.3	278	8.5
23	C	M	140	53	3,997	51	143	3.6	301	7.5	3,749	51	143	3.8	308	8.2
24	C	M	120	54	.....	..	...	...	...	....	3,252	50	148	4.6	307	9.4
26	C	M	100	59	3,138	58	115	3.7	283	9.0	2,939	55	164	5.6	372	12.6
27	C	M	105	48	4,068	50	164	4.0	337	8.3	.....	..	...	...	...	....
28	C	F	90	49	2,760	51	122	4.4	259	9.4	.....	..	...	...	...	....
29	C	F	90	48	.....	..	...	...	...	....	3,348	55	122	3.6	281	8.4
30	W	M	120	50	3,270	50	115	3.5	238	7.2	3,007	49	140	4.7	296	9.8
Average.....			107	51	3,345	53	142	4.3	313	9.4	3,069	51	138	4.6	294	9.6
Standard deviation...			4.6		421.9	2.9	24.0	0.74	51.7	1.8	277.1	5.1	19.6	0.84	36.8	1.7
Cord Clamped Late																
10 D	C	M	0	..	.....	..	...	...	...	....	2,904	61	115	4.0	304	10.4
12 D	C	M	0	..	.....	..	...	...	...	....	2,925	58	157	5.4	385	13.1
14 D	C	M	0	..	.....	..	...	...	...	....	2,534	60	114	4.5	288	11.4
15 D	C	F	0	..	.....	..	...	...	...	....	2,690	68	79	2.9	257	9.0
16 D	C	F	0	..	.....	..	...	...	...	....	3,001	62	132	4.4	358	11.9
18 D	C	F	0	..	.....	..	...	...	...	....	2,883	61	178	6.2	469	16.2
19 D	W	M	0	..	3,245	58	131	4.0	321	9.9	2,911	60	160	5.5	413	14.0
20 D	W	M	0	..	3,216	59	129	4.0	323	10.0	3,010	51	117	3.9	247	8.2
21 D	W	M	0	..	.....	..	...	...	...	....	3,223	63	151	4.7	420	13.0
22 D	W	F	0	..	3,963	62	117	3.0	317	8.0	3,606	56	135	3.7	318	8.8
23 D	C	M	0	..	2,826	62	164	5.8	433	14.9	2,626	61	140	5.3	370	14.9
25 D	C	F	0	..	.....	..	...	...	...	....	3,060	60	157	5.1	405	12.2
26 D	W	M	0	..	2,946	61	131	4.4	346	11.7	2,711	61	115	4.2	304	11.2
27 D	C	M	0	..	3,560	65	118	3.3	346	9.7	3,319	62	170	5.1	461	13.9
28 D	W	F	0	..	3,489	62	140	4.0	402	11.6	.....	..	...	...	...	....
29 D	C	M	0	..	3,078	60	164	5.5	421	13.7	2,837	59	152	5.4	379	13.4
30 D	W	F	0	..	.....	..	...	...	...	....	3,238	58	157	4.8	386	11.9
Average.....			..	..	3,287	61	137	4.2	364	11.2	2,967	60	139	4.7	360	12.1
Standard deviation..			..	..	337.6	2.0	17.2	0.88	44.5	2.1	269.5	3.5	25.2	0.74	65.6	2.2

* D indicates delayed clamping of the cord.
† Ht. indicates hematocrit reading.

infants deprived of the placental blood; averages of 11.2 per cent and 12.1 per cent were obtained on the first and the third day in the infants receiving this blood. The third day difference between groups was significant (reliability = 3.7); the first day difference was not greatly significant (reliability = 1.9), but there were fewer experiments in this category.

COMMENT

During normal, physiologic birth the infant retrieves much of the blood which is in the placental and umbilical vessels. This is effected by uterine contraction on the placenta in the third stage of labor and probably also by vasoconstriction of the umbilical arteries and their branches (DeMarsh, Alt, Windle and Hillis [8]). Discrepancies in hematocrit value, plasma volume and total blood volume among the reports in the literature (table 1) would seem to be related in part to a failure to take this into consideration. A closer approach to normal values for the early neonatal period is believed to have been made in the experiments performed after delayed clamping of the umbilical cord. Averaging the present results obtained on the first and third days for the series of infants for whom clamping of the cord was delayed (24 experiments), we obtain the following values: hematocrit reading, 60 per cent; plasma volume, 138 cc., or 4.5 per cent of body weight; total blood volume, 361 cc., or 11.8 per cent of body weight.

Contrasting with these are the averages of 25 experiments made on the first and third days after immediate clamping of the umbilical cord, depriving the infants of an average of 107 cc. of placental blood: hematocrit reading, 51 per cent; plasma volume, 140 cc., or 4.5 per cent of body weight; total blood volume, 301 cc., or 9.6 per cent of body weight. It is evident that if the red corpuscular mass (51 per cent) of the 107 cc. of placental blood lost to these infants is added to their average total volume of blood, these figures become similar to those obtained for the delayed clamping series.

The plasma volume appears to remain constant, but the cell volume varies with the cell mass of the transfused placental blood. This demonstrates an adjustment of plasma volume with attendant hemal concentration at birth of the infants whose umbilical cords are not clamped until placental blood has been forced into their circulations. Hemal concentration as a result of adjustment of the plasma volume has been convincingly demonstrated in adult experimental animals receiving comparable quantities of blood by transfusion (Boycott and Oakley [13]; Takahashi [14]). Adjustment of the plasma volume takes place with great rapidity. In the present experiments it was reasonably complete fifteen to one hundred and eighty minutes after birth. The sudden rise in hematocrit reading after birth is explained by this mechanism. It should be viewed as a physiologic process, highly desirable from the standpoint of providing reserve iron to the infant to carry it through the nursing period (Wilson, Windle and Alt [15]).

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13. Boycott, A. E., and Oakley, C. L.: J. Path. & Bact. **38**:91 (Jan.) 1934.
14. Takahashi, S.: Tohoku J. Exper. Med. **25**:550 (March 31) 1935.
15. Wilson, E. E.; Windle, W. F., and Alt, H. L.: Deprivation of Placental Blood as Cause of Iron Deficiency in Infants, Am. J. Dis. Child. **62**:320 (Aug.) 1941.

It is of some interest to know how the blood is distributed between the fetus and its placenta at the end of prenatal life. The present experiments permit an estimation of the quantities of blood in the two tissue masses at the culmination of labor. Because the average hematocrit reading of umbilical cord blood is the same as the average hematocrit reading of venous sinus blood on the first and third days in infants whose cords were clamped immediately at birth, we shall assume that the total quantity of blood in all the fetal tissues equals the sum of the total volume in the infant (301 cc.) and the total volume in the placenta and membranes.[16] The average quantity of blood flowing freely out of the placental end of the severed cord was 107 cc. The volume of residual blood in the placenta is unknown, but we estimate that it is less than 50 cc. The total volume of blood manufactured by the fetus therefore should be greater than 408 cc. and less than 458 cc. Of this the placenta and membranes contain between 26 and 34 per cent. In the sheep, Barcroft and Kennedy [10] estimated blood volumes with the Evans blue method and found that one fourth to one fifth of the blood was in the placental circuit at the end of gestation. It would seem that the human placenta contains a slightly greater proportion of the fetal blood than does that of the sheep.

SUMMARY AND CONCLUSIONS

The average total blood volume of human infants allowed to retrieve their placental blood at birth was about 361 cc., or 11.8 per cent of the body weight between birth and the third day of life. The hematocrit value of this blood was 60 per cent, and the plasma volume was 138 cc., or 4.5 per cent of the body weight.

Deprivation of the newborn of 107 cc. of placental blood, by clamping the umbilical cord immediately, gave rise to an average total blood volume of only 301 cc., or 9.6 per cent of the body weight. The hematocrit value, 51 per cent, was equal to that of the placental blood at birth. The plasma volume, 140 cc., or 4.5 per cent of the body weight, was not altered.

It is estimated that more than 26 per cent, but less than 34 per cent, of the average total fetal blood is in the placental circuit at the end of prenatal life. Under normal conditions of birth most of this blood passes to the newborn infant as the uterus contracts on the placenta during the third stage of labor.

A rapid adjustment of plasma volume accompanied by concentration of the formed elements of the blood takes place after birth when blood from the placental circulation is transfused to the circulation of the infant.

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16. We ignore the possibility that a decrease in plasma volume has begun during labor.

Case Reports

VARICELLA DEVELOPING AFTER CONTACT WITH HERPES ZOSTER

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No general agreement has been reached regarding the question of a common causal virus of herpes zoster and varicella. Some are of the opinion that the two diseases are etiologically related; others believe that the cause of herpes zoster is entirely different from that of varicella. The cases to be presented support the view that herpes zoster and varicella may be manifestations of the same virus.

REPORT OF CASES

On Oct. 4, 1941, the care of two children, P. C. W. and K. W. (ages 4 and 1½ years, respectively), was assumed by their grandparent, L. K. M. On October 5 L. K. M. became ill, but she continued to care for the children until October 12. On October 10 an eruption appeared on the right side of the back and the right thigh and leg of L. K. M., accompanied by pain, itching and general malaise. Herpes zoster was diagnosed and treatment instituted.

On October 24, two weeks after the eruption appeared on the skin of L. K. M. and nineteen days after she began to feel ill, the youngest child (K. W.), a girl, exhibited a few cutaneous lesions; by October 25 these had the typical appearance and distribution of chickenpox. The lesions were particularly dense over the right side of the back and the right thigh and leg, the distribution closely following that of the herpetic lesions in L. K. M.: The course of the disease was mild.

On November 7, two weeks after K. W. had her first chickenpox lesions, the oldest child (P. C. W.), a boy, had a few vesicles; by the next day these had progressed to a recognizable eruption of chickenpox. The course was severe, with fever, malaise and some prostration.

There had been no children or adult visitors at the home who had previously been ill or who subsequently became ill, and the youngest child had not been off the premises during the week of October 5. During the preceding week, of September 28, K. W. and P. C. W. had been out of doors but had played only with neighborhood children who were well at the time, had not been ill and did not have chickenpox subsequently. The accepted incubation period for varicella for K. W. had elapsed as far as a known outside exposure was concerned, and that for P. C. W. would not have begun until about October 17.

COMMENT

It would appear that chickenpox developed in K. W. after she was exposed to L. K. M., who had severe herpes zoster. (As of Feb. 20, 1942, L. K. M. still had not completely recovered.) P. C. W. showed the first lesions of chickenpox two weeks after exposure to K. W.

No attempts were made at identification of the virus similar to past studies carried out on human beings in which certain serologic reactions between the vesicular contents and convalescent serums suggested that herpes zoster and varicella are manifestations of the same virus. Purified suspensions of varicella and zoster bodies are agglutinated by the corresponding convalescent serums, and cross agglutination also takes place, although to a lesser degree. Sabin [1] stated that the pathologic picture of herpes zoster is entirely compatible with a virus causation, and Kolmer and Tuft [2] in their discussion of varicella reported that eosinophilic intranuclear bodies resembling those found in herpes have been found in the affected cells. A review of much of the past work on this problem has been presented by Blatt, Zeldes and Stein,[3] who reported two minor epidemics of chickenpox following contact with herpes zoster.

The sequence of events in the cases reported tends to confirm the observation previously recorded that chickenpox does follow exposure to herpes zoster in some cases and that the two diseases may be caused by the same virus. However, the weight of evidence as it appears in the literature supports the view of Rivers and Eldridge [4] that the cause of herpes zoster is different from that of varicella, although possibly related.

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MULTIPLE CYSTIC TUBERCULOSIS OF THE BONES

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After the report by Martin [1] of a case of multiple cystic tuberculosis of the bones, a similar condition was diagnosed at autopsy in this hospital.

REPORT OF A CASE

S. McK., an 11 month old Negro boy, was brought to the hospital Sept. 5, 1939 with the complaint that he did not gain any weight.

The present illness had begun three months before, when the baby became irritable, failed to gain weight and appeared weak. The loss of weight had been progressive, and the irritability had increased. The child was normal at delivery and during his first eight months. He had been fed dairy milk during the day and breast fed at night. Orange juice and cod liver oil were not given until one week before his admission to the hospital. The physical examination revealed a very emaciated, irritable child, with the appearance of a little old man; the face was pinched and the eyes were sunken. The nose, ears and throat were not abnormal. The cervical lymph nodes were enlarged. The chest was symmetric, and expansion was equal on the two sides. The breath sounds were natural, and the chest was resonant in all areas. The heart was of normal size, and no murmurs were heard. The abdomen was scaphoid. The lymph nodes in the groins were much enlarged. Both elbows and both knees showed a pronounced fusiform swelling, associated with great increase in size of the articular ends of the bones. The fourth finger on the left hand showed a fusiform swelling of the middle and proximal phalanges. The swellings were all firm and noncrepitant and extended far beyond the epiphysial lines. There were no changes of the overlying skin. On the child's admission the hemoglobin content of the blood was 60 per cent and the white cell count 7,050 with 49 per cent polymorphonuclear leukocytes, 50 per cent lymphocytes and 1 per cent monocytes. The urine after administration of dextrose was clear and acid and showed a trace of albumin, a 2 plus reaction for sugar, coarse granular casts and large numbers of red cells. The Kline reaction of the blood was positive. The child was very malnourished and died four days after admission.

An autopsy was performed, but permission was not obtained for examination of the skeletal system. The lower portion of the upper lobe of the right lung contained a firm, consolidated area. On section this area measured 3 by 1 by 1 cm. and extended from near the hilus to the pleura. It consisted of several large areas of caseation without any surrounding fibrosis. The corresponding hilar lymph nodes were enlarged and contained gray areas of caseation 2 mm. in diameter. The peribronchial lymph node adjacent to the main bronchus on the

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From the City Memorial Hospital, Winston-Salem, N. C.

1. Martin, D. W.: Multiple Cystic Tuberculosis of the Bones. J. Pediat. **15**:254-257 (Aug.) 1939.

Fig. 1.—Roentgenogram of upper extremities.

Fig. 2.—Roentgenogram of lower extremities.

right was enlarged and contained an area of caseation 1 cm. in diameter. The remainder of the right lung and the left lung were not abnormal except for hyperemia. The liver was studded with numerous small gray nodules, less than a millimeter in diameter, spaced from 1 to 2 cm. apart, visible both externally and on the cut surface. The spleen was twice normal size, soft and dark purple. The capsule was studded with numerous opaque yellowish gray nodules, measuring 3 to 4 mm. in diameter. The cut surface was also studded with a large number of firm gray nodules of similar size which showed central caseation. In the distal 15 cm. of the ileum Peyer's patches were hypertrophied and reddened and showed small superficial ulcerations. The mesenteric lymph nodes were all enlarged and on section showed frequent 1 to 2 mm. gray opaque areas, particularly at the periphery. The microscopic examination bore out the gross diagnosis of primary tuberculosis of the lung with hematogenous spread to other organs. It

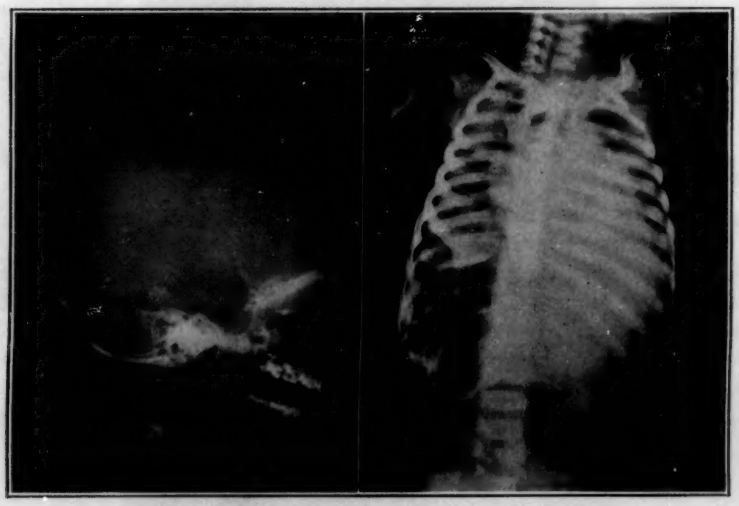

Fig. 3.—Roentgenogram of head and of chest.

disclosed numerous miliary tubercles in the kidneys. The ulcerations of Peyer's patches were tuberculous. Although permission was not given for examination of the bones, roentgenograms of the entire skeletal system were made, and the following statement is the report of Dr. J. P. Rousseau, who examined the films: "Examination of the skeletal system shows multiple central cystic lesions in the shafts of the long bones and in the carpals, metacarpals, tarsals, metatarsals and phalanges. There are similar lesions in the frontal bone of the skull. Associated with the cystic lesions of the long bones are definite osteitis and periostitis, with new periosteal bone being laid down parallel to the shafts of the long bones. There is decreased density of the bones throughout the skeletal system. The findings are suggestive of the presence of osteitis tuberculosa multiplex cystica. Scurvy can be ruled out because of the destructive lesions, which are never present in that disease. The increased use of radiotransparency of the bone suggests some type of nutritional disturbance."

COMMENT

This is apparently the fourteenth case of multiple cystic tuberculosis of the bones to be reported in pediatric literature. The suggestion, made by Martin and Fogel,[2] that demonstrable lesions in the bones are caused only when local resistance has been lowered by previous injury, such as decalcification or rickets, appears to be borne out in this case. The bones show evidence of decalcification. The finding of a primary tuberculous complex with marked caseation, no evidence of healing and hematogenous spread to other organs indicates either poor resistance or an overwhelming infection. The nature of the tuberculous lesion and its widespread appearance throughout the viscera of the child leave little doubt that the lesions in the bones are also of tuberculous origin. The positive Kline reaction of the blood in this case is apparently incidental, as there is no gross or microscopic evidence of syphilis, although this disease may have contributed to the demineralization seen on the roentgenograms.

City Memorial Hospital.

2. Martin, D. W., and Fogel, D. H.: Multiple Cystic Tuberculosis of the Bones, Am. J. Dis. Child. **61**:322-326 (Feb.) 1941.

Progress in Pediatrics

CHILDREN'S FEET, NORMAL AND PRESENTING COMMON ABNORMALITIES

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CHICAGO

Probably no phase of pediatrics is subject to more pitfalls of misinformation, mismanagement and lack of a sound understanding than the general problem of children's feet. Because of many factors, the medical profession in great part has neglected this particular field and left it to some of the cults, to shoe manufacturers and, more especially, to shoe salesmen for development and in some instances for exploitation. Apparently most physicians have considered the entire problem of feet to be beneath them, figuratively as well as literally. A growing demand on the part of parents for direction in the care of their children's feet has made the pediatrician particularly aware of the need of a more comprehensive knowledge of the development, anatomy, physiology and general care of these important structures.

Too much of the information regarding this subject has come from the commercial efforts of shoe manufacturers, appliance sales organizations and the pseudoscientific "foot specialist" schools which frequently are sponsored by them. The success of such groups is measured usually in sales and not in scientific achievement. With but few exceptions, the curriculums of recognized medical schools offer no specific instruction in this field. The application of the general principles of growth and function to problems of the feet is inadequate, and the students emerge with little or no knowledge of the subject. They in turn perpetuate this fault as they develop professionally and take their places on the faculties of medical schools or in the teaching services of hospitals.

Partly because of a misconception of the true meaning of the term "orthopedic surgery" and partly because this specialty is concerned with bone and joint problems, most persons with problems concerning the feet are seen in the orthopedic departments of clinics and hospitals or in the private practice of orthopedic surgeons. Inasmuch as the term pediatrics is derived from the same Greek root as is orthopedics, it is

Read before the American Academy of Pediatrics, Region 3, May 15, 1941.

proper that the representatives of the two specialties show similar interest in these problems and to some degree accept the common derivation of their respective cognomens.

A foot should never be considered as a detached segment of the body. In structure, growth and function it reflects the whole organism. It is heir to every developmental, nutritional and functional disturbance found elsewhere in the host. In the embryo, the foot arises as an early component part of the lower limb bud, migrates from the trunk with the development of the leg and eventually assumes a position and structure well adapted to its function. It is composed of various skeletal elements, joints, ligaments, muscles, nerves, blood vessels, lymphatics and soft and epithelial tissues. Each of these tissues is subject to the same pathologic changes found in similar structures elsewhere in the body.

Defects of germ growth and of segmental development are commonly seen as congenital malformations. Agenesis, adactylism, polydactylism, syndactylism and congenital fusion or absence of tarsal structures are encountered in unending variety. Agenesis and distorsions of vascular and myogenous structures occur, presenting perplexing clinical problems. All these defects reflect departures from orderly embryologic differentiation. The scope of this paper does not permit detailed consideration of each of these entities.

However, a word about congenital clubfoot is in order. This deformity represents hereditary defects, germ defects of other origin, unequal growth of the tibial and fibular elements of the extremity or irregular growth of soft tissue and of osseous components. In some cases the condition reflects an abnormal position in utero. In not a few instances it is associated with spina bifida magna or occulta. The deformities of clubfoot vary greatly as to type and degree and present severe problems in their correction. Many distorted ideas as to treatment abound. In brief, proper care consists of early manipulation followed by skilful application of plaster casts. These procedures should be repeated at short intervals until overcorrection is obtained and maintained. This means the application of corrective measures as early as possible, in most instances on the first day of life. The contracted tissues will never be softer or yield more easily than on the day of birth. Delayed correction is much more difficult and less satisfactory. In no condition is follow-through care over months and years more essential.

The three functions of the normal foot gradually develop from the time of birth, reflecting the regular growth of the infant. A prehensile or grasping function of the foot is in evidence early in life, as shown by the grasping motion of the toes when in contact with firm objects in

the newborn. This reflex act is similar to the prehensile reaction of the hand. Except under certain circumstances, this prehensile function in the foot gradually is lost. In the hand it continues to develop to a high degree. The covering of the foot with a stocking, clothing, bedcovers or a soft shoe gradually dulls this reaction until it is all but lost. In the rare cases in which hands are congenitally absent, the prehensile functions of the feet continue in amazing degree.

As the child grows, muscular coordination advances through the rolling and creeping stages to that of standing, at first accomplished with the assistance of the hands and arms and later unaided. The feet are widely separated and turned outward, thereby increasing the area of the base of support. This posture reveals the static function of the feet in its simplest form. The biped attitude of the human being has resulted in a concentration of weight bearing to the two feet, in marked contrast to the four point base of support in quadrupeds. The muscles of the lower leg and foot have had but little opportunity to develop prior to active weight bearing. Consequently, a more or less flat foot contour of the feet on the assumption of their static function may be considered as normal. The growth and strength of the foot and leg muscles are accelerated by weight bearing. Muscles, ligaments and bones respond by increasing both in size and in tone.

The third function, propulsion, follows shortly, as the first steps are made and a gait established.

The proper functioning of the foot in young, rapidly growing children depends on maintenance of a balance between muscle action, ligamentous tone and skeletal growth. A common defect is seen in the "toe walker," the child who does all or most of walking on his forefoot. This reflects an overactivity of the large calf muscle group, possibly a lowered threshold of the calf reflex. This may be seen in later life as a springy type of gait somewhat similar to that seen in running. Such foot action necessarily involves considerable strain on all mid foot structures.

The normal stride in a heel and toe gait may be divided into three component parts: extension (fig. 1 *A*), support (fig. 1 *B*) and propulsion (fig. 1 *C*). In extension, the leg is advanced to a position ahead of the base of support. The foot is dorsiflexed and the knee slightly bent. The heel then strikes the ground; the foot flexes at the ankle until the sole and the toes are in contact and then gradually enters into the phase of support as the body moves forward and the knee straightens. The maximum period of support occurs when the tibia is in a vertical position. At this point the weight of the body carried through the tibia to the ankle joint is divided into two factors, transmitted to the os calcis and to the forefoot respectively. The momentum

of the body and the propulsion from the opposite foot carry the weight over "center," the tibia inclining forward to about 15 to 20 degrees. At this point, tension on the calf group of muscles results in a reflex

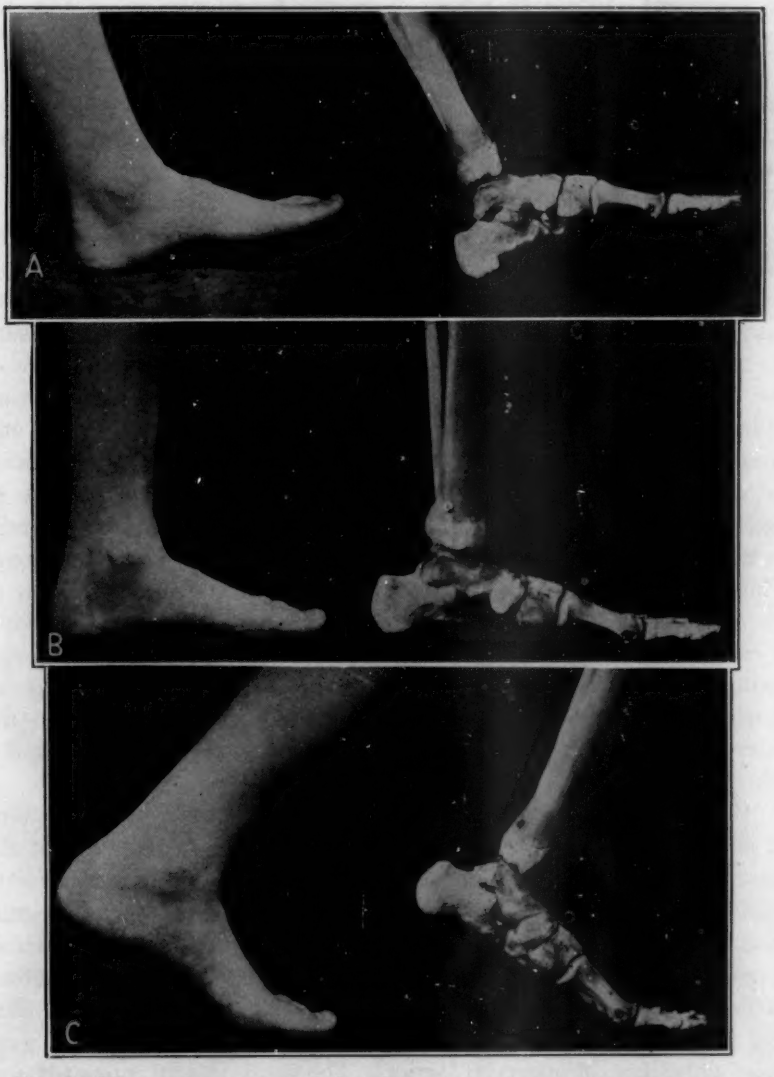

Fig. 1.—Heel and toe gait. *A*, foot just passing from phase of extension into earliest part of phase of support, heel in contact with floor. *B*, maximum period in phase of support, with tibia vertical and foot in contact with floor. *C*, later stage of phase of propulsion.

contraction which lifts the heel, transmitting weight bearing to the metatarsal and toe areas and blending support into the third phase,

that of propulsion. Contraction of the posterior tibial and peroneus longus muscles, as flexors of the forefoot, supplemented by the intrinsic flexors of the toes, completes the propulsion of the body to a similar sequence of events involving the opposite foot. In propulsion there is a gradual shifting of weight from the lateral margin of the sole to the first metatarsal and the first toe.

The imprint of the wet foot on the floor reflects the area of weight bearing but not its degree. The latter is shown by the thickness of the skin on the sole and by the areas of wear on the bottom of the shoe. Details of normal gait vary considerably, becoming so characteristic that many persons can be recognized by their gait alone.

Contracture of the muscles of the calf opposes advancement of the tibia beyond a vertical position and throws premature strain on the forefoot, stretching the ligaments supporting the longitudinal arch, with resulting pronation through the midfoot, or exerting excessive pressure on the metatarsal area if the ligaments are unyielding. Contracture of the calf muscles may be congenital or acquired. Acquired contracture reflects failure of this muscle group to maintain its full length and elasticity in proportion to tibial growth. The custom of using chairs, as well as the absence of calf-stretching exercises in the routine of activities, may contribute to this. Such contracture is most frequent in the gastrocnemius portion of the calf, which crosses the knee joint. This contracture is demonstrated in the full range of dorsiflexion at the ankle when the knee is flexed and the limited motion when the knee is extended (figs. 2 and 3). A child with foot strain will avoid movements that increase tension on tender ligaments. The step may be shortened or the foot turned outward to permit a rolling from the outer to the inner side of the foot, to replace dorsiflexion at the ankle (fig. 4).

Pronated feet in children result from inadequate ligamentous tone of primary or secondary origin. It is unreasonable to expect that the tarsal structures should exhibit degrees of tone differing from that found in similar structures elsewhere in the body. Pronated feet are the rule in the presence of general muscular or ligamentous hypotonia of any origin. Examples are commonplace in rickets, amyotonia, arachnodactyly, congenital heart disease (fig. 5) and malnutrition and after any prolonged illness. Pronated feet of secondary origin reflect some basic unbalance of muscular action. The treatment of pronated feet consists in the restoration of muscle and ligamentous tone by the elimination of the causative factors. The therapy of pronated feet must be general as well as local. Exercises should be directed toward the strengthening of flexor muscles acting on the toes and the flexors of the forefeet (fig. 6). Stretching of the calf muscles should always accompany exercises directed toward increasing their strength (fig. 7).

The use of molded foot plates or the prolonged use of plaster casts is rarely if ever indicated. Shoes of substantial construction are essential. These should be altered so as to move the center of weight bearing laterally, restoring the normal bony relations in the feet. Operative measures are indicated only in cases in which the condition is persistent. In these, entirely satisfactory results may be anticipated.

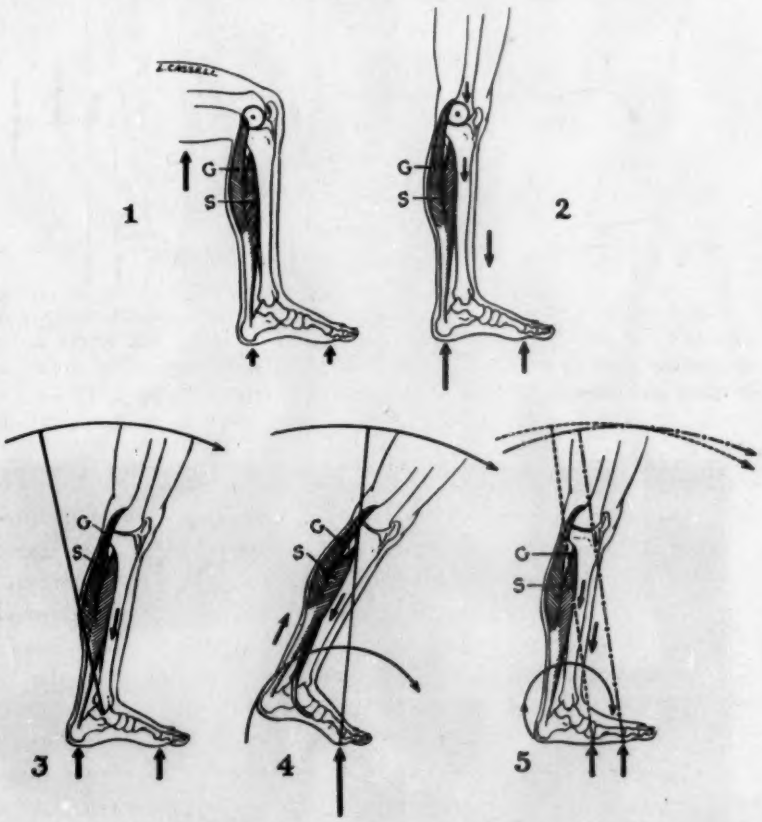

Fig. 2.—Action of calf muscle in regard to foot. *G* indicates gastrocnemius and *S* soleus. Arrows indicate weight or resistance to weight. *1*, gastrocnemius crossing knee joint and relaxed when knee is flexed. *2*, gastrocnemius under tension when subject is standing. *3*, normal tension on calf muscles as tibia advances beyond vertical (leg motion through arc centered at ankle). *4*, calf muscle contracting, transferring arc of motion to metatarsal heads. *5*, with contracted calf, arc of motion through midtarsal area if ligaments are relaxed or through heads of metatarsals if ligaments are intact. In first instance a pronated foot results, and in latter, excessive pressure, calluses, etc., under forefoot.

Hollow feet (cavus deformity) (fig. 8*A*), in which the longitudinal arches are increased, are rigid. The cushioning action is absent, and as a result the gait is stilted. The carrying of the body weight through a

very limited area of the sole and heel frequently results in formation of calluses, bursas, etc. The toes become almost functionless, for they invariably assume a position of hyperextension at the metatarsophalangeal joints, with flexion of the more distal articulations. The

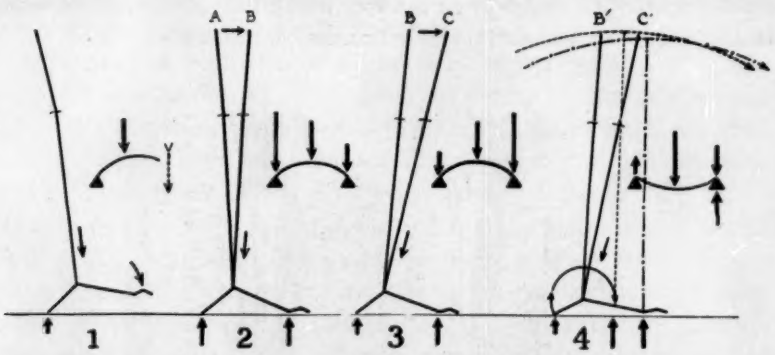

Fig. 3.—*1*, heel striking floor at beginning of support (insert shows point of pressure). *2* and *3*, varying points of pressure on floor and forces acting on longitudinal arch structures (inserts) during phases of support. *4*, forces acting on tarsal structures in presence of contracted calf (similar to fig. *2*, *4*).

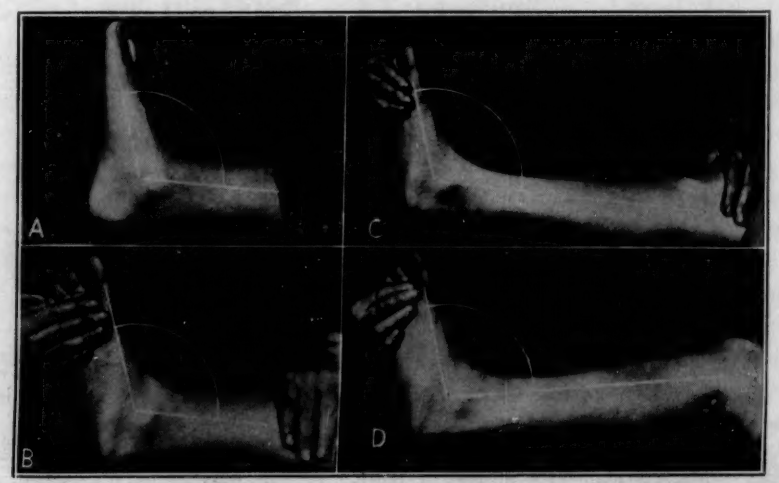

Fig. 4.—*A*, false dorsiflexion at ankle when foot is held in slight valgus position. *B*, true dorsiflexion when foot is held inverted. *C*, true dorsiflexion when foot is held in inversion and knee in complete extension. *D*, false dorsiflexion when foot is held in inversion with knee flexed.

disability from the lesser degrees of cavus deformity is slight, but that arising from the more severe hollow foot is such as clearly to warrant correction by surgical methods.

Fig. 5.—Extreme relaxation, clubbing of toes and third degree pronation of feet in congenital heart disease.

Fig. 6.—Toe exercises: *A*, over golf ball; *B*, over telephone book; *C*, toe writing.

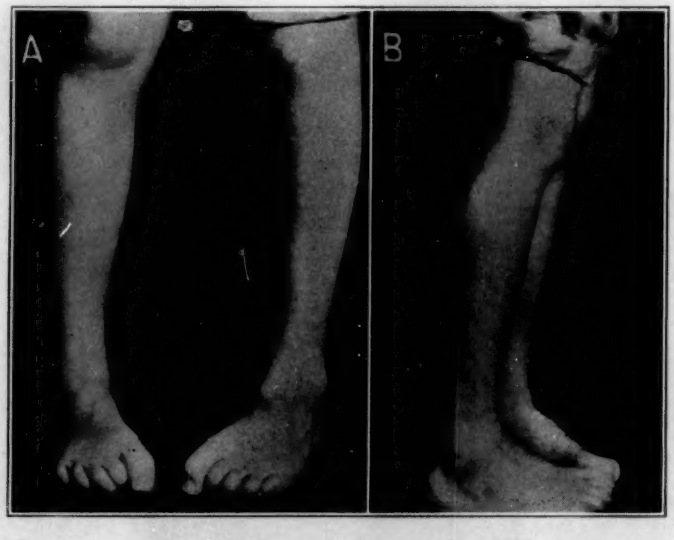

Fig. 7.—Calf-stretching exercise. *A*, feet are in position to start exercise. *B*, with knees extended, body is moved forward without heels being raised from floor. This exercise stretches entire calf group of muscles, especially gastrocnemius.

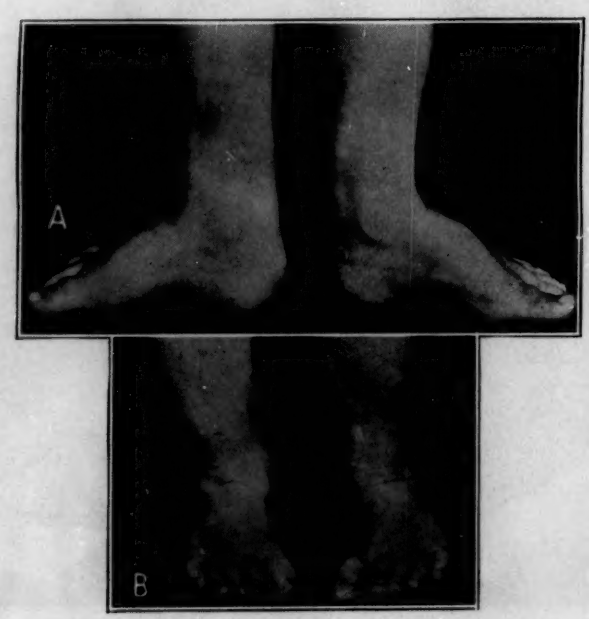

Fig. 8.—*A*, cavus deformity, right and left feet, associated with spina bifida occulta. *B*, metatarsus varus, mild on right and pronounced on left.

Metatarsus varus in the infant yields to manipulation and cast therapy. For the older child, more radical procedures become necessary (fig. 8*B*).

The more common deformities of the toes rarely give rise to symptoms except when they become pressure points in contact with shoes. Persistent manual stretching followed by splinting with adhesive tape will yield some favorable results.

If the foot is considered as an intricate structure of bone, ligaments, muscles, blood vessels, nerves, etc., and it is realized that such structures must function freely in order to develop properly, it will be evident that any covering or continued external pressure will exert some deleterious effect on normal development. The use of any shoe or stocking restricts movement to some extent. Inasmuch as shoes and stockings have become necessary articles in the present civilization, it is imperative that their use interfere with function of the foot in the least possible degree. A good shoe for a growing foot should afford:

1. Adequate protection against injury and extremes of temperature.

2. Plantar support similar to that afforded by the ground or floor (fig. 9).

3. An interior which will permit unrestricted variation in size and movement of the foot during all the phases of its function.

Most manufacturers of children's shoes are making genuine effort to produce well constructed, useful shoes. Frequently, however, the emphasis placed on some minor element of design and some pseudo-scientific catch phrase used in advertising divert attention from the more substantial merits of the product. Only at rare intervals does one see any reference to the interior of the shoe in the volumes of advertising that fill the periodicals and the daily press. The interior of the shoe concerns the foot; its exterior, the eye. Some observations now in progress at the Children's Memorial Hospital on the relation of shoe interiors to feet are most instructive. These indicate that in general children's feet are fitted so poorly with shoes that numerous deformities may be attributed to this fact alone. Many shoes are entirely too short, cramping and crowding the toes severely, preventing any muscular function whatever. Worn-down heels exaggerate any tendency to a valgus or varus position. These studies also indicate that old shoes as a rule are shorter and have less foot space than do new ones. The constricting effect of short stockings should not be overlooked. This deplorable situation begins with improper fitting and is accentuated by total neglect of the interior of the shoe. The custom, frequently arising from economic necessity, of passing shoes down to younger brothers, sisters or others is not without fault as to the resulting damage done to growing feet.

Shoe manufacturers in general have yet to meet the challenge of producing well designed, sturdy shoes at a cost which can be met by the average family budget.

Any widespread demand for proper shoes fostered by pediatricians will be met by the shoe industry with a lowering of the cost to the consumer.

For obvious reasons no specific recommendations can be made regarding shoes now available. Many makes of shoes are as satisfactory

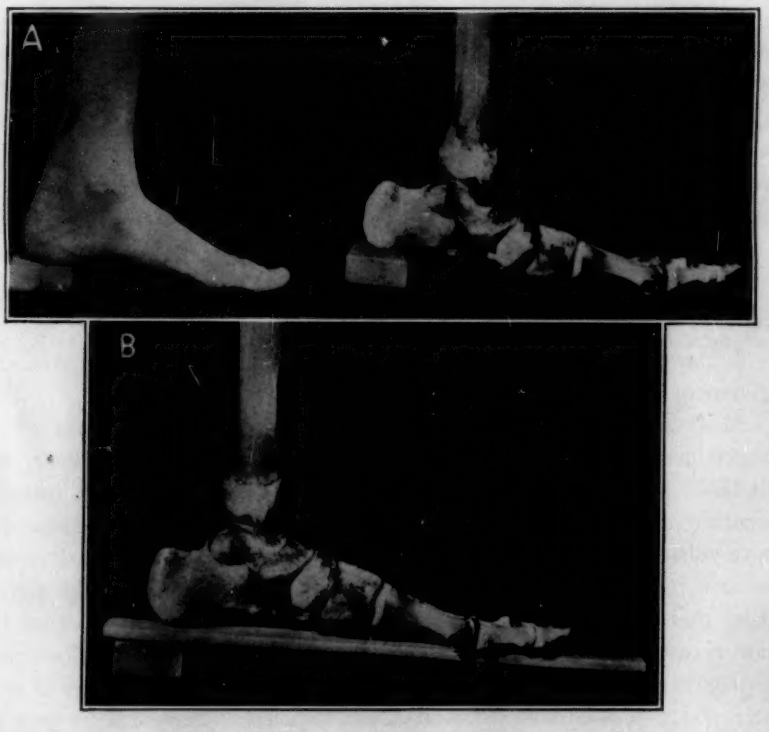

Fig. 9.—*A,* medial view of foot, showing effect of heel in relation to tarsal structures. *B,* lateral view, showing inclined support which should be afforded by heel.

as any shoe can be; others are not. Whether or not the shoe extends above the ankle or is of oxford type is not essential. A shoe that assumes a rocker-like contour of its sole and heel is unquestionably detrimental. A shoe without toe room is the same.

A sound understanding of normal and abnormal feet will come only from intelligent observation from a physiologic, anatomic and mechanical point of view. The fact that the foot is an integral part of a delicately balanced living unit must always be kept in mind.

6 North Michigan Avenue.

News and Comment

GENERAL NEWS

Oral examinations of the American Board of Pediatrics will be held as follows:

In Chicago on Nov. 2 and 3, 1942, preceding the annual meeting of the American Academy of Pediatrics.

In New York on Dec. 5 and 6, 1942.

All applicants expecting to take their oral examinations in the fall should take their written examination locally, under a monitor, on September 18.

Correspondence

COMPOSITION OF VITAMIN D CONCENTRATE

To the Editor:—Because of requests for further information concerning the vi-delta liquid concentrate (Lederle) used in the work described in the article entitled "Prevention of Dental Caries by Massive Doses of Vitamin D," by Drs. Béla Schick and Hermann Vollmer and me, which appeared in the December 1941 issue of the AMERICAN JOURNAL OF DISEASES OF CHILDREN (page 1184), I wish to report that this preparation is a fish liver oil containing a mixture of several D vitamins, which may include vitamin D_2 and vitamin D_3, and that viosterol or synthetic vitamin D was not added.

RALPH HOWARD BRODSKY, D.M.D., New York.

Abstracts from Current Literature

Biochemistry; Bacteriology, and Pathology

INCIDENCE OF MEMBERS OF THE SALMONELLA GROUP IN RATS. M. T. BARTRAM, H. WELCH and M. OSTROLENK, J. Infect. Dis. **67**:222 (Nov.-Dec.) 1940.

"Stomach tube feeding of massive doses of Salmonella enteritidis on 6 consecutive days usually results in a rapid fatal infection. Single feeding by the same technic of graded doses ranging from 100 to 100,000 organisms resulted in more uniform and lasting infection with smaller doses. Positive fecal specimens have been obtained from 15 out of 24 rats fed 100 organisms beginning in some instances on the first day and persisting in a few individuals as long as the 34th day.

"The possible existence of the carrier state in a small number of infected rats is indicated by the intermittent excretion of the infecting organism over a period of at least 7 weeks.

"Serological studies may lead to false conclusions in tracing the source of an outbreak of Salmonella food poisoning, since continued high agglutinin titers have been obtained 4 months after injection.

"Transmission of the infection from 1 infected rat to cage mates was demonstrated with recovery of the infective organism from the composite feces and from the individual rats as long as the 40th day after being placed with the infected animal.

"Examination of feces from 800 domestic rats and agglutination tests on the blood of 26 revealed the absence of Salmonella infection in all instances."

AUTHORS' SUMMARY.

INFLUENCE OF ADJUVANT SUBSTANCES ON IMMUNITY. G. RAMON, Presse méd. **48**:857 (Oct. 30-Nov. 2) 1940.

For fifteen years experimental data have been accumulating on the effects of certain inert substances injected with antigenic material. Not only is the rise in antitoxin more rapid, but it also appears to be more permanent and more lasting. Practically, this phenomenon has been of use in vaccination against anthrax, in the prophylaxis of tetanus, in the prevention of diphtheria and in the so-called "associated vaccination," in which two or more anatoxins are combined with a bacterial vaccine (e. g., diphtheria, tetanus and typhoid-paratyphoid). Ramon discusses in detail the theoretic and practical aspects of the subject.

DAFFINEE, Boston.

Metabolism; Infant Feeding; Milk and Other Foods

STERILIZATION OF COMMERCIAL MILK IN THE CITY OF LA PLATA. G. B. CAVAZZUTTI, Rev. Soc. de pediat. de La Plata **1**:81 (Nov.-Dec.) 1940.

In response to a request from the Committee on Hygiene of the City Council of La Plata, Argentina, for an opinion on the value of compulsory pasteurization of milk, the Society of Pediatrics of La Plata advised against its introduction. This opinion was based on the fact that milk supplied to the city came from so many different sources where proper attention to sanitation, cooling and transportation were not observed that it was impossible to make the heavily contaminated milk satisfactory for human consumption simply by pasteurization. Furthermore, the Department of National Hygiene reported in 1936 that 23.9 per cent of milk samples labeled "pasteurized" showed the presence of pathogenic tubercle

bacilli. It will require a long process of education of dairymen, a rebuilding of dairies and a reorganization of the transport of milk before the product reaching the city will be worth pasteurizing.

HIGGINS, Boston.

BUTTERMILK IN THE TREATMENT OF DEHYDRATION AND GASTROINTESTINAL DISORDERS. H. P. DIAZ and J. ROSELLI, Rev. Soc. de pediat. de La Plata **1**:158 (Nov.-Dec.) 1940.

A 7 month old infant presenting severe dehydration and toxicity from diarrhea and vomiting was treated successfully by clyses of dextrose solution followed by feedings of buttermilk and dextrimaltose.

HIGGINS, Boston.

MIXTURES OF MOTHER'S MILK AND OTHER MILK FOODS. H. P. DIAZ, Rev. Soc. de pediat. de La Plata **1**:162 (Nov.-Dec.) 1940.

In certain cases in which mother's milk is inadequate or in which supplementary feeding is desired, the author suggests the trial of mixtures of mother's milk with cow's milk or buttermilk. These mixtures were suggested to avoid the sudden shock of weaning and for infants who had been on artificial feeding but presented intestinal disorders.

HIGGINS, Boston.

Vitamins; Avitaminoses

NEW STUDIES ON RICKETS. A. B. MARFAN, Nourrisson **28**:137 (July); 169 (Sept.-Nov.) 1940; **29**:1 (Jan.) 1941.

This paper is a discussion of new conceptions of rickets. As far as Marfan is concerned, the discovery of vitamin D has contributed no more to the clarification of the etiology of rickets than insulin did to clarify the etiology of diabetes. It is still not known why the pancreas becomes diseased in diabetes. Marfan sees in the administration of vitamin D not much more than a symptomatic treatment. He believes that heredity, disposition, constitution, infections (including syphilis), diabetes, eclampsia, renal diseases, gastrointestinal disturbances and faulty nutrition can all be the causes of rickets.

HEYMANN, Cleveland.

VITAMIN A. DEMETRIO SODI PALLARES, Prensa méd. mex. **11**:195 (Nov. 15) 1940.

Vitamin A is derived from the chemical substance carotene (long chemical graphic formulas are presented). It is found abundantly in nature—in eggs, meat, milk, butter and the livers of cod, halibut and tuna. Beta carotene is found in spinach, lettuce, carrots and most vegetables and fruits having a green or yellow covering. If a hen is deprived of carotene the yellow part of the egg is white; yellow canaries deprived of this substance turn white.

Absorption occurs in the small intestines by way of the lymphatics, and the substance is conducted by the thoracic duct to the blood. Its presence in the thoracic duct has been demonstrated in cases of empyema. Ninety-five per cent of the vitamin A is stored in the liver. Also in man it is found in the subcutaneous tissues. Carotene likewise is deposited in the Kupffer cells of the liver. It is eliminated in the feces and urine, and part of it is destroyed in the intestines.

The function of cones of the retina is perception of colors. The function of the retinal rods is to transform luminosity of little intensity suffciently to stimulate the optic nerve. Atrophy of the epithelium occurs in vitamin A deficiency followed by keratinization. The symptoms are photophobia, Bitot's spots, coffee-colored pigmentation of the conjunctiva, blepharitis, meibomianitis and in advanced stages blindness.

GIFFEN, Toledo, Ohio.

Hygiene; Growth and Nutrition; Public Health

SCHOLASTIC EDUCATION FOR HOSPITALIZED CHILDREN. CAUPOLICAN R. CASTILLA, Rev. méd. latino.-am. **26**:163 (Nov.) 1940.

Authorities of children's hospitals have a responsibility for the welfare of the patients entrusted to their care, not only for their health but also for their culture and education. Elementary courses within the hospital are advised for those children between the ages of 6 and 14 years with chronic afflictions whose general condition permits them to do mental work, i. e., those with cardiac and renal diseases, diabetes and orthopedic conditions. This practice has a beneficial effect on the psychic state and discipline.

Classes for children in the pediatric hospital of Buenos Aires, Argentina, were started three years ago, and it is planned to extend and improve this educational work.

DWYER, Kansas City, Mo.

ORGANIZATION OF INSTRUCTION IN SCHOOLS FOR DEAF MUTES. F. CHAVANNE, Oto-rhino-laryng. internat. **24**:289 (Dec.) 1940.

Chavanne criticizes the present practice of segregating the deafened in special schools, where they are isolated from normal children and from life in general. Condemned also is the practice of grouping deaf-mutes of normal intelligence with backward children or those with subnormal mentality. The mentally subnormal children should be placed in special institutions. The instructors should be chosen from those who have had experience in teaching the deafened and should be adequately compensated. Directors should be chosen from among the instructors.

DENNIS, San Diego, Calif. [ARCH. OTOLARYNG.]

Prematurity and Congenital Deformities

INTERSTITIAL (PLASMA CELLULAR) PNEUMONIA OF PREMATURE OR WEAK INFANTS. A. NITSCHKE, Ztschr. f. Kinderh. **62**:200 (Oct. 17) 1940.

Observations on 31 infants (29 premature) with interstitial pneumonia are reported. At its height the disease is characterized by marked dyspnea, caused by almost complete infiltration of both lungs. The characteristic physical pulmonary observations are: fine inspiratory crackling, areas of bronchial breathing and impaired resonance. For about four weeks preceding full development of the disease infection of the upper or lower part of the respiratory tract is present. During this time roentgen examination often shows typical changes and the sedimentation rate is frequently accelerated. In most cases the disease is severe and prolonged, but mild examples are seen. Interstitial emphysema is a rather frequent complication. The prognosis is grave, but short wave therapy was found to lower the mortality materially. Prophylaxis (avoidance of infection of the upper respiratory tract) is important.

SIEMSEN, Chicago.

A CASE OF PROGERIA OF GILFORD. W. A. MANSCHOT, Nederl. tijdschr. v. geneesk. **84**:3774 (Sept. 28) 1940.

This report is a further clinical description and report of extensive pathologic-anatomic investigation of the case of progeria (of Gilford) described first by Schippers in 1916, when the patient was 3½ years old. The patient died at the age of 27. The anterior lobe of the hypophysis proved to be deficient in eosinophilic cells, a deficiency demonstrated objectively by the method of Rasmussen. Progeria should be regarded as a particular form of hypophysial dwarfism, with an inadequate development of tissues derived from the mesenchyma.

VAN CREVELD, Amsterdam, Netherlands.

Newborn

HEMORRHAGIC DIATHESIS OF THE NEWBORN. W. W. WADDELL JR. and GEORGE McL. LAWSON, J. A. M. A. **115**:1416 (Oct. 26) 1940.

The authors made multiple determinations of prothrombin time and clotting time for 189 control infants and 400 vitamin K–treated babies. There were 111 patients with prothrombin deficiency in the untreated group, with 23 showing symptoms, in contrast to no patients with hypoprothrombinemia and only 4 babies with symptomatic bleeding in the treated group (vitamin K given to mother and baby).

The authors observed a seasonal incidence of rise in prothrombin deficiency particularly during the winter months. They postulated a dietary deficiency to be responsible and suspected the occurrence of intracranial hemorrhage.

By analysis of the reported deaths from intracranial hemorrhage over several years, they plotted a definite increase in deaths in the winter months, particularly in those deaths occurring between the fourth and the seventh day of life.

HEERSMA, Kalamazoo, Mich.

THE NEWBORN NURSERY FROM THE POINT OF VIEW OF THE PEDIATRICIAN. JULIUS H. HESS, J. A. M. A. **115**:1542 (Nov. 2) 1940.

Marked reductions in infant and maternal mortality have taken place in the past ten years, and 1940 has almost halved the 1930 rates. Least reduction occurs in the deaths during the first week and month of life. Obstetric and pediatric cooperation at this critical time is necessary. Pediatric supervision of the nurseries should be active and directed especially at increasing the incidence of breast feeding. Prenatal and postnatal care of breasts and avoidance of early complementary feedings and fluids will be indispensable. Care should be standardized before discharge, the mother instructed in manual expression and the expected behavior of the baby.

HEERSMA, Kalamazoo, Mich.

THE NEONATAL PROBLEM IN INFANTS OF DIABETIC MOTHERS. WARREN R. SISSON, J. A. M. A. **115**:2040 (Dec. 14) 1940.

The study of 65 consecutive infants born of mothers with diabetes mellitus emphasizes the high morbidity and mortality rates. Forty-three of the infants showed clinical symptoms and 18 per cent died. At term the babies are large, but premature delivery was common. The causes of death were various, but a common picture was that of asphyxia within twelve hours, with cyanosis and convulsive seizure. The average blood sugar content was high, but symptoms did not often parallel it.

Oxygen and drainage of secretions are recommended immediately after birth, and routine parenteral administration of dextrose solution is not advised.

HEERSMA, Kalamazoo, Mich.

THE USE OF VITAMIN K IN THE NEWBORN. GEORGE D. JOHNSON, J. South Carolina M. A. **36**:336 (Dec.) 1940.

The author briefly reviews the literature on hemorrhagic diseases of the newborn, stating that previous to the discovery of vitamin K if the babies were reached in time transfusion would save them. He reviews the case of a baby 3 days old with typical signs of hemorrhage from the mouth, nose and rectum, which were promptly relieved with the administration of vitamin K. The use of vitamin K is indicated: (1) when an infant shows evidence of hemorrhagic disease of the newborn or hypoprothrombinemia, (2) when the infant is premature, (3) when there has been prolonged and difficult labor and (4) when circumcision is contemplated before the seventh or eighth day.

WESTON, Columbia, S. C.

THE PERILS TO WHICH NEWBORN INFANTS OF DIABETIC MOTHERS ARE EXPOSED. BERTIL SÖDERLING, Nord. med. **8**:2000 (Nov. 9) 1940.

The newborn infant of a diabetic mother is threatened by sudden death during the first three days of life. This happens in spite of successful delivery and splendid appearance of the infant. This risk is undoubtedly due to the fact that the child was born with a disorganized hormonal secretion, which is not restored to a normal state until the end of the first week of life. The symptoms are intense general cyanosis, collapse and sudden death, with or without hypoglycemia. Careful and continuous attendance by day and night during the first seventy-two hours affords a chance of effective treatment of any suddenly occurring circulatory failure. Epinephrine is given if necessary. In order to combat hypoglycemia two to three daily injections of 10 cc. of 20 per cent dextrose solution during the critical days should be given.

WALLGREN, Göteborg, Sweden.

Acute Contagious Diseases

EPIDEMIC MENINGITIS. ARCHIBALD L. HOYNE, J. A. M. A. **115**:1852 (Nov. 30) 1940.

Experience with cases of meningococcic infections in the Chicago area revealed no relation between the severity of the disease and the size of the epidemic. Occasionally cases of the more severe form occurred singly.

Intraspinal treatment was omitted after 1934, and the fewer the punctures done the better the course of the patient and the fewer the complications.

Sulfanilamide is used alone or in conjunction with intravenous administration of serum. The presence of petechiae or positive blood culture may obviate the necessity of spinal puncture.

Tables are included of the results of treatment in three Chicago hospitals.

HEERSMA, Kalamazoo, Mich.

A PREPARATION OF TOXIN SUITABLE FOR ORAL IMMUNIZATION AGAINST SCARLET FEVER. GEORGE F. DICK and GLADYS HENRY DICK, J. A. M. A. **115**:2155 (Dec. 21) 1940.

The progress made in oral administration of scarlet fever toxin since its inception in 1932 is outlined. It was discovered that enteric-coated tablets were most practical and produced the least reactions. The patient's rate of intestinal activity is very important in estimating the dosage required. One hundred and thirty-one persons were given various courses of treatment. In the group of 102 susceptible subjects given doses of 42 to 91 million cutaneous test doses in a two to three week period, 94.7 per cent were immune on retest. Reactions included an occasional rash or a transient stomachache.

This treatment at present is suitable only for subjects for whom subcutaneous injections are impracticable, but improvements in the technic are still being made.

HEERSMA, Kalamazoo, Mich.

A PRELIMINARY DISCUSSION OF POLIOMYELITIS IN SOUTH CAROLINA IN 1939. G. E. MCDANIEL, J. South Carolina M. A. **36**:331 (Dec.) 1940.

An excellent review of the epidemic of poliomyelitis in South Carolina in 1939 is given by the writer. The attack was severe in Charleston and Charleston County, with an attack rate of 177.5 per hundred thousand population. The epidemic spread eastward, where the traffic is heaviest, instead of along the coast. As in most epidemics the rural population suffered much more heavily than the urban. In 63.5 per cent of the cases the patients were children under 5 years of age. In 80 per cent of the cases in Charleston County there was some paralysis, while some degree of paralysis occurred in 95 per cent of those outside of Charleston. This indicates that in a goodly number the disease was probably not diag-

nosed. There were cases in forty-four of the forty-six counties of the state. It is interesting to note that the Negroes were attacked at the same rate as the white persons. There were 35 deaths, or a 7.9 per cent mortality rate. Three hundred and seventy-five cases were studied in detail. Information on recovery of the susceptible cotton rat and of virus from sewage was the contribution South Carolina made toward a better understanding of poliomyelitis during the epidemic.

WESTON, Columbia, S. C.

THE SCHICK REACTION: STABILIZED TOXIN COMPARED WITH TOXIN DILUTED IN SALINE SOLUTION. WILSON and N. E. GOLDSWORTHY, M. J. Australia **2**:403 (Oct. 26) 1940.

Because diphtheria toxin diluted in saline solution is unstable, search has been made for a more suitable diluent. This study is a comparison of the Schick reaction in 447 children. The authors used the orthodox saline solution and a buffered gelatin solution for dilution of the toxin. The results agreed in 96.4 per cent. When there was disagreement, the results seemed to show that the toxin in saline solution was more sensitive.

TENNEY, Madison, Wis.

SPECIFIC SERUM THERAPY IN POSTDIPHTHERITIC PARALYSIS. E. FERRANDO, Rev. Soc. de pediat. de La Plata **1**:99 (Nov.-Dec.) 1940.

One month after she had diphtheria, for which antitoxin had been given, a 5 year old girl showed apathy, great muscular weakness, strabismus, general muscle flaccidity and loss of reflexes. Ten thousand units of antitoxin for three consecutive days seemed to be of therapeutic value.

HIGGINS, Boston.

POLIOMYELITIS AND VARIATION OF IMMUNITY. H. MULLER, Ztschr. f. Kinderh. **62**:162 (Oct. 17) 1940.

The author argues that the febrile illness which frequently precedes an attack of poliomyelitis (producing the so-called dromedary type of fever) is nonspecific. Instead of the preliminary febrile illness, physical trauma (especially overexertion) or psychic strain may precede poliomyelitis. In about three fourths of 59 cases a history of a "preparatory" insult was elicited. At the time of an epidemic a "preparatory" insult may make the difference between a silent infection and one accompanied by paralysis. Apparently the insult itself is less important than the time at which it occurs and the constitution of the person involved. The interval between the "preparatory" insult and the onset of the disease is much shorter when the insult is noninfectious than when it is infectious. In agreement with some other writers, the author is of the opinion that in addition to silent and paralytic forms of the disease there is a prolonged form with meningeal manifestations, representing a state of equilibrium between the causative organism and the host.

Experimental studies with the Schick, Dick, tuberculin and bouillon tests in cases of poliomyelitis showed considerable variability, presumably representing variations in immunity. In cases of a noninfectious insult immunity is supposedly affected via the vegetative nervous system.

SIEMSEN, Chicago.

ASEPTIC COMPLICATIONS FROM THE CENTRAL NERVOUS SYSTEM IN SCARLET FEVER. H. C. A. LASSEN and JENS BANG, Nord. med. **8**:2130 (Nov. 23) 1940.

During the period 1934-1940, 9,826 patients with scarlet fever were treated at the Blegdam Hospital in Copenhagen, Denmark. Twenty of these displayed symptoms and signs of involvement of the central nervous system. All of them showed pleocytosis of the spinal fluid with predominance of lymphocytes. In 6 cases this pleocytosis was the sole sign of a lesion of the central nervous system, while in 10 cases there were clinical signs of meningitis without focal lesions and

in 4 cases evidence of focal processes. Recovery took place in all cases. The authors believe that the cause of this complication is a virus infection added to the scarlet fever infection. The seasonal distribution did not coincide with that of poliomyelitis.

WALLGREN, Göteborg, Sweden.

TWO CASES OF MALIGN CHICKENPOX. T. BRANDER, Nord. med. **8**:2547 (Dec. 21) 1940.

The authors report on 2 children, 12 and 2 months old, evacuated from the Russian-Finnish border during the war in 1939-1940, who had suffered from serious illnesses and still were in bad condition when they acquired chickenpox. In the younger child the efflorescences became hemorrhagic, and in both cases they were followed by necroses of the underlying tissues, secondary infections, pyoderma and septicemia. Death occurred on the twenty-fifth and seventh day respectively after the manifestation of varicella.

WALLGREN, Göteborg, Sweden.

A CASE OF POSTVACCINAL ENCEPHALITIS. J. MÖNNICH, Tidskr. f. d. norsk. lægeforening. **60**:886 (Nov. 1)1940.

A girl of 8 years became ill on the twelfth day after smallpox vaccination, with convulsions and loss of consciousness. Examination revealed rigidity of the neck, high fever and pleocytosis of the spinal fluid. Sulfapyridine (2-[paraaminobenzenesulfonamido]-pyridine) was administered in large doses (2 to 5 grains [0.13 to 0.32 Gm.] per day). There was amelioration on the third day and she was free from fever on the fourth day. The child was discharged healthy.

WALLGREN, Göteborg, Sweden.

AN EPIDEMIC OF INFECTION DUE TO CORYNEBACTERIUM DIPHTHERIAE GRAVIS IN A CHILDREN'S HOME IN AMSTERDAM. A. L. NOORDAM, Nederl. tijdschr. v. geneesk. **84**:3962 (Oct. 12) 1940.

There was an outbreak of diphtheria caused by the gravis type of Corynebacterium diphtheriae in a children's home at Amsterdam, Netherlands, from which the children could not be evacuated. Of 96 children 26 contracted the disease, 19 of whom had received complete immunization four months before. Eight patients had a negative Schick reaction just before the onset of the illness. Thirty children were isolated as carriers. The value of the immunization is discussed, and the possible usefulness of the *injection de rappel* (i. e. a fourth injection one-half to one year after the immunization) is pointed out.

VAN CREVELD, Amsterdam, Netherlands.

VALUE OF DETERMINATION OF THE TYPE FOR THE EPIDEMIOLOGIC EXAMINATION IN DIPHTHERIA. A. C. RUYS, Nederl. tijdschr. v. geneesk. **84**:3969 (Oct. 12) 1940.

In the autumn of 1939 and the spring of 1940 diphtheria in Amsterdam, Netherlands, was nearly exclusively caused by the mitis type. In a few cases connected epidemiologically an atypical gravis strain was grown, corresponding with a strain isolated by Siemens in 1936. In the same period in a rigidly secluded group of Jewish children from Germany living in Amsterdam, an outbreak prevailed caused by the normal gravis type. Two groups of carriers, later shown to carry different types, for some months lived together in an institution; in 16 of 54 children a change of type was observed. Of 17 carriers of the mitis type 7 had a gravis infection, and of 18 carriers of the gravis type 4 had a mitis type of infection. It is undesirable that diphtheria carriers should be cared for together, as the carrier period can be lengthened by reinfection.

VAN CREVELD, Amsterdam, Netherlands.

Acute Infectious Diseases

THE EFFECT OF LARGE DOSES OF VITAMINS A, B, C AND D ON THE INCIDENCE OF UPPER RESPIRATORY INFECTIONS IN A GROUP OF RHEUMATIC CHILDREN. ANN G. KUTTNER, J. Clin. Investigation **19**:809 (Nov.) 1940.

Vitamins A, B complex, C and D were added to the average well balanced diets of rheumatic children under observation in an institution. One hundred and eight children were divided into two groups, one receiving the regular diet and the other the same diet plus additional vitamins. No evidence was obtained to suggest that the incidence of infections of the upper respiratory tract was reduced by the additional supply of vitamins.

GUEST, Cincinnati.

A MACROSCOPIC AGGLUTINATION TEST WITH TYPHUS RICKETTSIAE PREPARED FROM INFECTED RODENT LUNGS. N. PAUL HUDSON, J. Infect. Dis. **67**:227 (Nov.-Dec.) 1940.

"The method of Castaneda of producing large amounts of typhus rickettsiae in pure suspension from the rodent lung has provided an antigen for macroscopic agglutination tests. The technique of the test is described as a simple procedure comparable with similar bacterial tests.

"A limited survey was made of the possible applications of the test to the examination of typhus serum of experimental animals and man. It was found that the rickettsiae were agglutinated by the serum of the immunized horse, rabbit and guinea pig. The antigen was clumped by some serum specimens, in low dilutions, from a group of Mexican citizens intended as controls. No reaction was observed in a similar examination of Ohio residents and normal laboratory animals. Some persons vaccinated against Mexican typhus gave positive reactions. Rickettsiae were agglutinated by the serum of 5 patients ill and convalescent from typhus.

"The limitations and extent of application of the test are yet to be learned."

AUTHOR'S SUMMARY.

THE IN VITRO ACTION OF IMMUNE SERUM ON THE LARVAE AND ADULTS OF TRICHINELLA SPIRALIS. JOSÉ OLIVER-GONZÁLEZ, J. Infect. Dis. **67**:292 (Nov.-Dec.) 1940.

"The action of specific immune and hyperimmune serums from rats, guinea pigs and rabbits was tested in vitro on larvae and adults of Trichinella spiralis. In all of the immune and hyperimmune serums precipitate formed in large masses around the mouth of the larvae and was associated with immobilization, disintegration and death of many of the larvae. In addition to the oral precipitate, anal and vulval precipitates were formed around the adults. The vulval precipitate seemed to obliterate the opening and may be the mechanism whereby the escape of the embryos is prevented in immune serums.

"The time at which precipitates appeared varied according to the degree of immunization. In the serum from the hyperimmune animals precipitates appeared earlier and were denser than in the serum from immune animals. Inactivated serum was as effective as unheated or complemented serum.

"No precipitates were formed around the larvae or adult worms when placed in normal or in anti-Cysticercus-crassicollis serum.

"Serum from rabbits immunized with saline suspensions of powdered larvae apparently caused the death of over 50% of the larvae, but had little or no effect on the adults.

"Emphasis is laid upon the probable role of specific antibodies in acquired immunity to Trichinella spiralis."

AUTHOR'S SUMMARY.

THE CHEMOTHERAPY OF STAPHYLOCOCCIC INFECTIONS. EDWIN E. OSGOOD and INEZ E. BROWNLEE, J. Pediat. **17**:740 (Dec.) 1940.

"In cultures of living human marrow infected with hemolytic or nonhemolytic Staphylococcus aureus, neoarsphenamine and sulfathiazole have proved superior to sulfanilamide and sulfapyridine. . . .

"The most desirable concentration of neoarsphenamine is 1:150,000; this corresponds to about 130 gamma of arsenic per 100 c.c. . . .

"The optimal concentration of sulfathiazole is from 5 to 10 mg. per 100 c.c., with relatively little difference in effectiveness in the lower and higher concentrations.

"In some experiments neoarsphenamine was definitely superior to sulfathiazole. In other experiments the reverse was true. The combination of the two drugs was often more effective than either alone and was always more effective than the less effective of the two used.

"Neither drug led to complete sterility of the cultures in as high a percentage of the cases as did sulfanilamide against the beta hemolytic streptococcus when similarly tested.

"The larger the inoculation of organisms, the less effective were the drugs.

"A tentative dosage plan to attain the proper blood levels of these drugs clinically is outlined.

"In a limited number of cases of serious staphylococcic infections, neoarsphenamine alone and sulfathiazole alone or the two in combination have demonstrated definite therapeutic value."

AUTHORS' SUMMARY.

MILITARY TETANUS. R. SIMON and G.-A. PATEY, Presse méd. **48**:935 (Nov. 20-23) 1940.

Of a total of 1,900 wounded soldiers received at the Besançon Center, Besançon, France, 14 had tetanus. Only 1 of these had received the regular immunization with tetanus toxoid, and he had a mild, localized form.

Treatment was most discouraging. Two of the 14 patients responded to the usual methods of serum therapy and sedatives. The authors used in addition injections of procaine hydrochloride to block the sympathetic pathways in cases in which peripheral pain (from a large wound or amputation stump) seemed to set off the spasms of tetanus.

DAFFINEE, Boston.

NEW TREATMENT FOR EXPULSION OF TRICHOCEPHALUS. RAOUL FOURNIER VILLADA, Prensa méd. mex. **11**:200 (Nov. 15) 1940.

After failure of classic treatments of infection with Trichocephalus, the author presents his original method, which up to the present has given 100 per cent good results.

1. Pass an Einhorn tube into the duodenum.

2. Inject through the tube 100 cc. of 33 per cent magnesium sulfate solution, at 40 C.

3. Without permitting escape of bile to the exterior, let pass for at least half an hour.

4. Into a container of 5 liters put a 4:5,000 solution of mentha piperita. The solution should always remain at 40 to 42 C. An Einhorn tube is then connected and passed; the solution is given slowly and regularly in about three fourths of an hour and the tube removed.

At times while the solution is passing the patient may desire to move the bowels, which may be permitted; the two tips of the Einhorn tubes are closed by a clamp until the action has been concluded.

The patients with trichocephalus infection treated up to the present in collaboration with Drs. Alberto Robles and Armando Porras and Javier Robles Gil number 25. The treatment of all was completely successful. GIFFEN, Toledo, Ohio.

ACUTE CARDIAC DISORDERS IN INFANTS DURING INFLUENZA. P. KISS, Orvosi hetil. **84**:227 (Aug. 31) 1940.

One often observes that during influenza infants show changes in the pathologic picture from one day to the other. The sensorium is confused; convulsions can also develop, and the infant becomes very agitated. The skin becomes livid, the extremities cold, the abdomen distended, the liver enlarged and the breathing high and "acidotic." One finds in a case of this kind marked tachycardia, and if the tachycardia reaches the "critical frequentia" (Wenkebach), which is mostly around 180 per minute, the function of the ventricles becomes defective, the coronary vessels cannot get a sufficient amount of blood and the condition of the heart grows rapidly worse. It is important to know that one should not give epinephrine in this situation, because this drug can increase the tachycardia. To avoid venous stagnation one should let blood in a sufficient amount (50 to 150 cc.). The use of strophanthin (0.1 to 0.2 mg.) seems to be very effective when the drug is added to a solution of dextrose (20 per cent) and given intravenously. Sedatives should also be given (barbital derivatives). For nourishment the infants receive only tea (15 per cent of the body weight). The prognosis is not always bad, even when the disease is very severe.

GÖTTCHE, Budapest, Hungary.

SALMONELLA SUIPESTIFER INFECTIONS IN CHILDHOOD. D. GAJZÁGÓ and O. GÖTTCHE, Orvosi hetil. **84**:233 (Aug. 31) 1940.

Six cases are reported. In all these a mild osteomyelitis developed. The bacteriologic examinations and the agglutination tests proved that the infections were caused by Salmonella suipestifer. The osteomyelitis caused by this bacillus is very benign; one does not find extensive destruction in the bones; there develop only small abscesses, the size of a bean or a walnut, and the whole process ends in four to six weeks. The infections are probably caused by adults who are carriers of the bacillus, and, because infants have the least resistance, the infection causes disease mostly in infants, whereas older children and adults become ill only when they are infected under especially unfavorable circumstances.

GÖTTCHE, Budapest, Hungary.

CHEMOTHERAPY OF PNEUMOCOCCIC INFECTIONS IN CHILDHOOD. A. NÁDRAI and K. FRANK, Orvosi hetil. **84**:421 (Aug. 17) 1940.

The authors report on 100 patients treated with Hungarian sulfapyridine preparations; 47 of them had lobar pneumonia, 50 had lobular pneumonia and 3 had pneumococcic peritonitis. The patients with lobar pneumonia had a quicker recovery, and complications (otitis or empyema) did not develop in a single one. When the complications had developed before the treatment was begun, the therapeutic effect was often lacking. In cases of lobular pneumonia the therapeutic effect was not always convincing. It is true that most patients with lobular pneumonia usually showed a quick recovery, but one often meets refractory examples. In cases of pneumococcic peritonitis, when the diagnosis and therapy occur early, the administration of sulfapyridine undoubtedly shows results. These preparations did not cause any damaging effect except vomiting and anorexia. If the preparations were given simultaneously with hypdrochloric acid and pepsin the vomiting and anorexia mostly decreased.

GÖTTCHE, Budapest, Hungary.

DERRIS POWDER AND THE FIGHT AGAINST ECTOPARASITES IN DOMESTIC ANIMALS AND IN MEN. W. SPOON, Nederl. tijdschr. v. geneesk. **84**:3139 (Aug. 17) 1940.

Derris powder, the highly ground root of a plant growing in Asia, is very efficient against many ectoparasites of domestic animals (such as lice and fleas of cats, dogs, cattle and horses), one of the active substances being rotenone ($C_{23}H_{22}O_6$). The author, working in the Commercial Department of the Colonial Institute, at

Amsterdam, Netherlands, tried its efficiency against human ectoparasites (body lice, head lice and itch mites). The contact with derris powder appears to be innocuous to the human skin. In scabies good results have been obtained (Beintema); experiments with body lice and head lice gave uncertain results.

VAN CREVELD, Amsterdam, Netherlands.

CULTURE MEDIUM OF LEIFSON FOR ISOLATION OF DYSENTERY BACILLI. A. C. RUYS, Nederl. tijdschr. v. geneesk. **84**:3562 (Sept. 14) 1940.

For the detection of bacillary dysentery by examination of the feces the Leifson culture medium (desoxycholate citrate agar) is indispensable. This medium must always be used freshly prepared, and subcultures must be made after twenty-four and forty-eight hours' growth at 37 C.

VAN CREVELD, Amsterdam, Netherlands.

USEFULNESS OF THE CULTURE MEDIUM OF LEIFSON IN BACTERIAL DYSENTERY. E. A. TILLEMA, Nederl. tijdschr. v. geneesk. **84**:3564 (Sept. 14) 1940.

Some results are recorded concerning the culture of pathogenic bacteria of the intestines on the sodium desoxycholate–citrate plate of Leifson. This plate proved to be preeminently suited for dysentery bacteria but not for the group of the paratyphoid and typhoid bacteria. The author concludes that compared with the culture solely on six Endo plates used up to the present for the investigation of one stool, the combined use of two Endo plates and one plate of Leifson medium in the search for dysentery bacteria will suffice. The introduction of the plate of Leifson thus will save time and also material.

VAN CREVELD, Amsterdam, Netherlands.

PATHOLOGIC ANATOMY OF INFLUENZA IN MICE. E. BEHR and H. N. HADDERS, Nederl. tijdschr. v. geneesk. **84**:3571 (Sept. 14) 1940.

A review is given of the pathologic changes in the lungs of mice inoculated with filtrates of the influenza virus of Wilson Smith. These consist in changes of the parenchyma and of the bronchus epithelium and in perivascular and peribronchial changes. Those of the lung parenchyma occur first, but the interstitial ones remain longest.

VAN CREVELD, Amsterdam, Netherlands.

AN UNKNOWN TYPE OF DYSENTERY BACILLUS AS THE CAUSE OF AN EPIDEMIC. R. T. SCHOLTENS, Nederl. tijdschr. v. geneesk. **84**:4613 (Nov. 23) 1940.

It was proved that an outbreak of 20 cases of dysentery in a sanatorium for children suffering from tuberculosis of the joints was caused by a type of dysentery bacillus unknown up to now. This type in view of its biochemical properties belongs within the group of lactose-fermenting dysentery bacilli, discovered by Castellani. Serologically it takes a separate place.

VAN CREVELD, Amsterdam, Netherlands.

Chronic Infectious Diseases

THE FIRST PREVENTORIUM OF "THE PEOPLE'S ANTITUBERCULOSIS LEAGUE" IN THE PROVINCE OF BUENOS AIRES. J. C. MARTINEZ and A. I. ZAMBOSCO, Rev. Soc. de pediat. de La Plata **1**:143 (Nov.-Dec.) 1940.

The history of the Antituberculosis League, its organization and the function of its preventorium is followed by a short discussion of the public health aspects of tuberculosis. The preventorium, for patients who give promise of being cured and have few or no tubercle bacilli in their sputum, was erected in La Plata, Argentina, at a cost of 100,000 pesos (about $100,000).

HIGGINS, Boston.

TUBERCULOUS CAVITIES IN AN INFANT. I. SRIBMAN and Y. MERCANTE, Rev. Soc. de pediat. de La Plata **1**:150 (Nov.-Dec.) 1940.

The authors, on reviewing the literature, were surprised to find that tuberculous cavitation of the lung in infants from 3 months to 2 years old had occurred in between 20 and 44 per cent of the children with infantile tuberculosis who had come to autopsy.

A case is reported of a 4 month old infant with multiple cavities found by roentgen examination and confirmed at autopsy.

HIGGINS, Boston.

CLINICAL SIGNIFICANCE OF PRIMARY ABDOMINAL TUBERCULOSIS. K. NISSLER, Ztschr. f. Kinderh. **62**:223 (Oct. 17) 1940.

During two years 29 cases were observed. In 13 there were calcified mesenteric glands, in 6 palpable tumors and in 5 palpably enlarged glands and calcification. According to Nissler, the symptoms are rather common. They include abdominal cramps and intestinal disturbances (frequently diarrhea alternating with constipation). Fever may be absent, it may be low grade or the temperature may be high for periods of one to two weeks. Roentgenologic studies with barium sulfate were found to be of little value in diagnosis. Apparently the source of the disease was milk. The author stresses the inadequacy of measures controlling the milk supply and the potential danger to children of consuming raw milk.

SIEMSEN, Chicago.

DOES SYPHILITIC AORTITIS OCCUR OFTEN IN PATIENTS WITH CONGENITAL SYPHILIS? K. ENGEL, Orvosi hetil. **84**:514 (Oct. 5) 1940.

It is true that the pathologic examination often shows characteristic changes of the aortas of children with congenital syphilis, but the clinical observations show that the clinical symptoms of syphilitic aortitis are very rare. The cause of this is still unknown. The cases thus far reported show that the clinical symptoms are manifested in patients between 10 and 15 years of age or between 40 and 45. The clinical symptoms therefore become evident very late.

GÖTTCHE, Budapest, Hungary.

SOME CASES OF TUBERCULOSIS IN WHICH THE INCUBATION PERIOD COULD BE DETERMINED. ARVID WALLGREN, Svenska läk.-tidning. **37**:1605 (Oct. 18) 1940.

The author reports 3 cases of primary pulmonary tuberculosis with erythema nodosum. The infection had taken place four and one-half, five and one-half and two to four weeks before the beginning of the fever. In 16 cases of tuberculosis with demonstrable incubation periods in which the exposure had been for only one day, the shortest incubation period was three weeks, the longest eight weeks and the average four and one-half to six and one-half weeks.

WALLGREN, Göteborg, Sweden.

ACUTE EXUDATIVE PLEURAL TUBERCULOSIS. BO CARSTENSEN, Nord. med. **8**:1810 (Oct. 26) 1940.

The author has confirmed the statement made by Jacobaeus that serous pleurisy depends on a true tuberculosis pleurae, and he therefore prefers this name. By means of the thoracoscopic method of Jacobaeus the author has made biopsies in 106 cases of acute exudative pleurisy and found typical tubercles on the surface of the pleurae in 89. In some instances histologic examination proved the specific nature of the tubercle. Tubercle bacilli were demonstrated by culture method and guinea pig test in 26 per cent. The author is of the opinion that the infection of the pleural cavity occurs per continuum or along the lymphatics from some central intrathoracic tuberculous gland. The acute onset of the disease is due to allergy.

WALLGREN, Göteborg, Sweden.

PRIMARY CONJUNCTIVAL TUBERCULOSIS. K. O. GRANSTRÖM, Nord. med. **8**:1926 (Nov. 2) 1940.

A female infant, born on Dec. 3, 1936, whose mother suffered from pulmonary tuberculosis was vaccinated subcutaneously with BCG on her tenth day. Tuberculin sensitivity was not distinctly present on examination six weeks and six months later. The infant was isolated from the sick mother until May 9 and was from that date on nursed by her. At 7 months of age (October 20) she fell ill with fever and there was lymphadenitis in front of the right ear. The lymphadenitis suppurated. In the pus tubercle bacilli of the human type were demonstrated. The infant was first seen Dec. 12, 1937. Besides the lymphadenitis and the fistulas there was a small tuberculous ulceration on the conjunctiva of the lower lid of the right eye. Finsen treatment was instituted. Six months later the infant was healthy.

WALLGREN, Göteborg, Sweden.

Diseases of Blood, Heart and Blood Vessels and Spleen

GAUCHER'S DISEASE IN EARLY INFANCY. EUGEN STRANSKY and LEON V. PECACHE, Acta med. Philippina **2**:21, 1940.

In the first case of Gaucher's disease to be reported in the Philippine Islands, the disease was noted when the patient was 10 months old. Since the child died at the age of 12 months, the disease was acute. The diagnosis was established by the enlargement of the spleen and by the fact that bone marrow obtained by splenic puncture revealed the characteristic giant cells. An anemia of the hemolytic type occurred. Therefore, the possibility of destruction of erythrocytes similar to that in hemolytic anemia is discussed. Differential diagnosis and the different types of lipid storage diseases are described.

NEURATH, New York.

HEMOLYTIC JAUNDICE: A CLINICAL ANALYSIS OF 28 CASES. JOHN C. SHARP, Ann. Int. Med. **14**:953 (Dec.) 1940.

The author reviews 28 cases of hemolytic jaundice occurring in twelve families. The ages of the patients varied from 3 to 63 years. He also reviews briefly clinical manifestations, complications, laboratory findings and results of medical and surgical treatment.

GARD, Galveston, Texas.

A VALUABLE SIGN IN THE DIAGNOSIS OF FUNCTIONAL AORTIC INSUFFICIENCY. SAMUEL A. LOEWENBERG, Ann. Int. Med. **14**:991 (Dec.) 1940.

In a very short article the author stressed the following finding: In functional aortic insufficiency the systolic pressures in the upper and lower extremities are about equal, whereas in organic aortic insufficiency the systolic pressure in the lower extremity is from 50 to 100 mm. of mercury higher.

GARD, Galveston, Texas.

SURGICAL TREATMENT IN TEN CASES OF PATENT DUCTUS ARTERIOSUS. ROBERT E. GROSS, J. A. M. A. **115**:1257 (Oct. 12) 1940.

Results of surgical treatment of patent ductus arteriosus in 10 children and adults are presented. The diagnosis was made positively after the third or fourth year by the presence of a continuous murmur accentuated during systole, heard over the whole chest and loudest in the second and third left interspaces, the characteristic machinery murmur and thrill. Other diagnostic signs are given.

Surgical intervention is indicated particularly in cases of retarded growth (in childhood and adolescence) as well as for the purpose of avoiding death from subacute bacterial endocarditis (30 per cent) and from cardiac failure (43 per cent). Because complete obliteration of the ductus has not been attained, it is questioned whether infection can be prevented or eliminated if present.

The surgical technic is briefly described, and the results showed marked subjective improvement in 8 cases and excellent gain in weight in the retarded patients, with rise in diastolic pressure to normal. One patient proved to have a small opening and was only slightly benefited, and 1 died of infection.

HEERSMA, Kalamazoo, Mich.

SURGICAL CLOSURE OF THE PATENT DUCTUS ARTERIOSUS. ROBERT E. GROSS, J. Pediat. **17**:716 (Dec.) 1940.

This paper discusses the rationale for surgical closure of the patent ductus arteriosus, the symptoms, the physical observations and the laboratory data which aid in the diagnosis of this congenital abnormality. The operative procedure is described briefly, and the postoperative complications are discussed. The results obtained in 13 cases in which the ductus was closed are recorded. Worth while results from this operation can be obtained when there has been retarded physical development, cardiac embarrassment or frank cardiac failure. It is too soon to judge whether ligation of the ductus will diminish the incidence of subacute bacterial endocarditis. The results of the operation are better if the ductus is closed in the period of childhood after the age of 5 or 6 years, by which time the natural processes of obliteration should have taken place.

RAUH, Cincinnati.

ABDOMINAL PAIN AND INFECTIOUS PURPURA IN A GIRL OF THIRTEEN YEARS. P. NOBÉCOURT, Presse méd. **48**:983 (Dec. 4-7) 1940.

A girl of 13 was seized with sudden severe abdominal pain. She vomited, and her temperature was found to be 102.2 F. Appendectomy was performed, but the appendix was normal. The following morning she presented the picture of peritoneal hemorrhage, and exploratory laparotomy showed blood in the peritoneal cavity. There was no bleeding about the appendical stump. Petechiae appeared on the body. A transfusion was given. The hematologic findings were normal except for bleeding time of fourteen minutes, clotting time of six minutes and platelet count of 200,000.

Abdominal pain due to purpuric manifestations may simulate any of the causes of an acute condition within the abdomen. Diagnosis is made difficult by the absence of visible purpura for two or three days. The infecting organism is most frequently meningococcus or pneumococcus. The cause of the pain seems to be spasm. Nobécourt considers this spasm to be brought on by activity of the abdominal sympathetic nervous system.

DAFFINEE, Boston.

RHEUMATIC PERICARDITIS AND ENDOCARDITIS IN A CHILD. E. G. CASELLI and J. F. MORANO BRANDI, Rev. Soc. de pediat. de La Plata **1**:136 (Nov.-Dec.) 1940.

A case of pericardial effusion on a rheumatic basis in a boy of 12 years is discussed. Physical signs in the left side of the chest were at first misinterpreted as a pleural effusion but were demonstrated by roentgen examination and by puncture to be pericardial. The differential diagnosis of the two types of effusion is discussed.

HIGGINS, Boston.

SULFAPYRIDINE TREATMENT OF LEUKEMIA. PREBEN PLUM and JENS K. POULSEN, Ugesk. f. læger **102**:1093 (Oct. 17) 1940.

Two patients with acute lymphatic leukemia were treated with 3 grains (0.2 Gm.) of sulfapyridine daily during one week. A temporary improvement of the general condition and of the blood picture took place. In 3 cases chronic leukemia was uninfluenced by the same treatment.

WALLGREN, Göteborg, Sweden.

THE RED BLOOD PICTURE OF HEALTHY ARTIFICIALLY FED INFANTS. ARNE ROTHE MEYER, Ugesk. f. læger **102**:1287 (Dec. 5) 1940.

A review is made of the recent publications on the red blood cell picture of healthy infants, and the author expresses the opinion that standard figures must be established separately for each country or region of a country. His own study comprises one hundred and seventeen examinations made on 89 healthy artificially fed infants, living in children's homes in Copenhagen, Denmark. The hemoglobin content was found to be 90 to 100 per cent for children aged 2 to 12 months. The lower limit was determined to be 85 per cent. The red cells varied between 4,320,000 and 5,200,000.

WALLGREN, Göteborg, Sweden.

IS THE SO-CALLED PHYSIOLOGIC ANEMIA TO BE REGARDED AS AN IRON DEFICIENCY ANEMIA THAT SHOULD BE TREATED? BENT ANDERSEN, Ugesk. f. læger **102**:1290 (Dec. 5) 1940.

The author cites some Danish veterinary studies indicating the possibility of reducing the mortality of suckling pigs by means of anemia-preventing measures. It has also been suggested by several authors to reduce morbidity in infants by prevention of the physiologic anemia. Andersen himself is of the opinion that there exists not a physiologic anemia but an iron deficiency anemia which should be treated with iron.

WALLGREN, Göteborg, Sweden.

ACUTE LYMPHATIC LEUKEMIA WITH LEUKEMIC TUMOR OF THE THYMUS. C. DE LANGE, Maandschr. v. kindergeneesk. **10**:83 (Dec.) 1940.

After an illness of barely six weeks a boy died of acute lymphatic leukemia at the age of 2½ years. The number of leukocytes was between 300,000 and 400,000, and about 4 per cent of them were polymorphonuclear. A roentgenogram of the chest showed on the right side a large sharply defined shadow in connection with the heart. The autopsy, including microscopic investigation, revealed a large leukemic tumor of the right lobe of the thymus resembling a lymphosarcoma to the naked eye. It is well known that in lymphatic leukemia an organ or part of an organ (intestinal tract) may have increased in volume to such a degree that at autopsy it is taken for a malignant growth. Under such circumstances the swelling of the spleen and the lymph nodes may be very moderate or almost lacking. Thymoma leukaemicum, as the swelling here may be called, is of rare occurrence.

VAN CREVELD, Amsterdam, Netherlands.

MEGALOCYTIC DEFICIENCY ANEMIAS IN SMALL CHILDREN. G. M. H. VEENEKLAAS, Nederl. tijdschr. v. geneesk. **84**:3860 (Oct. 5); 4517 (Nov. 16) 1940.

I. In children about 1 year of age an unbalanced diet of goat's milk can give rise to deficiency symptoms which to a certain degree resemble sprue and celiac disease. The author describes 2 cases of this syndrome. Further, he reports the case of a child of 15 months who never had fresh vegetables or fruit and who showed an alarming anemia and abnormal growth of hair. The anemia accompanying the deficiency due to an exclusive diet of goat's milk and that of the third child were hyperchromic and macrocytic. The changes in the bone marrow have to be considered identical with those found in Addison's anemia. Nevertheless, the anemias under discussion differ essentially from the latter because the disease heals with one single course of treatment and because achylia is seldom met with.

II. Examination of the bone marrow in these 3 children demonstrated with the help of curves that the postfetal megaloblast under the action of therapy can gradually decrease in size until it becomes a normoblast. The transition of the megaloblastic stage into the normoblastic is accompanied by a very marked increase of mitoses. The reticulocyte crisis in the blood must be seen as a final symptom of this process. Diagrams are given presenting the development of the cells of

the red corpuscle system under normal and certain abnormal conditions. There are many facts in favor of the conception that neutropenia and thrombopenia of these conditions may be signs analogous to the erythropenia.

VAN CREVELD, Amsterdam, Netherlands.

Diseases of Nose, Throat and Ear

INTRANASAL VACCINE SPRAY: ITS USE IN PROPHYLAXIS AGAINST THE COMMON COLD. THEODORE E. WALSH, Ann. Otol., Rhin. & Laryng. **49**:875 (Dec.) 1940.

The author gives an exhaustive discussion of the etiology of the common cold, the first factor being breaking down of the normal defense mechanism of the nose, which is the mucous covering of the mucosa and the ciliary action, allowing the organisms to enter the subepithelial tissues. Whether or not this develops depends on the presence of pathogenic organisms and the resistance of the organism to them. He discusses the biologic, metabolic and physical factors responsible for the breaking down of the mucous layer and the cessation of ciliary action. He feels that under favorable conditions the nasal defenses are adequate but that conditions may alter the nasal situation, allowing ingress of the infecting agent. Evidence seems to point to a virus as the infecting agent, the secondary invaders being the cause of most of the complications. Factors altering the normal metabolic processes of the body affect the mucosa of the upper respiratory tract by alteration either of ciliary activity and the production of mucus or of the immunologic response of the mucosa. On the physical side he cites the effects of heat on ciliary action and the fact that cilia cease to beat if not kept moist.

The results of subcutaneous and oral administration of cold vaccines having been found unsatisfactory, the intranasal route was investigated. The preparation of the vaccine and the administration by means of an atomizer are described. The results of vaccination by this method of 384 patients over an eight year period are given, and the author expresses his belief that his results warrant the conclusion that intranasal vaccination offers the best prophylaxis.

M. V. MILLER, Philadelphia. [ARCH. OTOLARYNG.]

SIGNIFICANCE OF THE TONSILS IN THE DEVELOPMENT OF THE CHILD. ALBERT D. KAISER, J. A. M. A. **115**:1151 (Oct. 5) 1940.

Four thousand and four hundred children were studied over a ten year period to determine the effects of tonsillectomy on certain complaints. Sore throat was considerably reduced in the half of the group subjected to removal of the tonsils. Statistically the effect on colds was not significant. Tonsillectomy and adenoidectomy reduced the incidence of otitis media in the younger children but effected less improvement when the children were over 8 years of age, at which age the natural atrophy of the adenoid tissue seems to inhibit this complication. There was at least a 50 per cent reduction in the occurrence of cervical adenitis. Investigation was also carried out in relation to pulmonary infections, rheumatic infections, contagious disease, nutrition and growth.

General improvement in child health due to advancement in many fields has raised the life expectancy of children. Twenty per cent of all children have definite indications for tonsillectomy, and about 50 per cent are operated on.

HEERSMA, Kalamazoo, Mich.

ACTION OF ROENTGEN IRRADIATIONS ON THE PHARYNGEAL TONSIL. F. CAVAZZANI, Arch. ital. di otol. **52**:591 (Dec.) 1940.

Cavazzani studied the effects of roentgen irradiation on the pharyngeal tonsil of 15 children, varying in age from 3 to 10 years. Four applications were made at intervals of one week, and the same technic was used for all. The majority of

the children had clinical evidences of the presence of adenoids, and half of them had a family taint of tuberculosis. They were reexamined at intervals during periods of from one to twenty months after treatment. In 10 instances the pharyngeal tonsil was eventually removed surgically, and the present report concerns the histologic changes observed in the specimens removed. These changes are summed up thus:

1. Within one to four months after irradiation, modifications (areolar necrosis) of the lymphocytoblastic matrix, associated with slowing of the production of mature lymphocytes, attenuation of the lymphocytic halo, dissociation and fusion of the follicles and interfollicular, perivascular and pericanalicular fibroblastic proliferation were observed. 2. After this phase signs of replacement of the lymphoid elements by reticuloendothelial tissue appeared, and eventually (twenty months later) the adenoid follicles were reduced in number and volume and there were marked signs of sclerosis.

DENNIS, San Diego, Calif. [ARCH. OTOLARYNG.]

MASTOIDITIS AND RETROAURICULAR LYMPHANGITIS. YAGO FRANCHINI, FRANCISCO BLOTTA and DOMINGO GUASTAVINO, Rev. méd. latino-am. **26**:58 (Oct.) 1940.

The authors distinguish between mastoidism, false mastoiditis and true mastoiditis and outline the medical treatment for these conditions. They emphasize the gravity of mastoiditis associated with cellulitis of the external ear and the importance of roentgen ray examination in deciding whether surgical intervention is indicated.

DWYER, Kansas City, Mo.

BIOLOGIC THERAPY OF SINUSITIS IN INFANCY. FRANCISCO BLOTTA, Rev. méd. latino-am. **26**:167 (Nov.) 1940.

With antivirus and bacteriophage, prepared after the bacterial flora were studied, the patients were treated topically. Local vaccination has no contraindications and can be used at any age. It did not provoke irritation or thermal response, nor is it toxic.

There was a rapid local action due to the lytic properties of the bacteriophage and the local effect of the antivirus. There was also a delayed reaction in which the stimulation of the cells of the reticuloendothelial system resulted in a specific immunity, more or less durable. When this form of vaccination does not result in complete recovery, it prepares the area for surgical intervention.

DWYER, Kansas City, Mo.

EXTERNAL LARYNGOCELE, WITH OPERATION. W. MEYER, Monatschr. f. Ohrenh. **74**:501 (Oct.) 1940.

Laryngocele may be either symptomatic, caused by obstruction to expiration, or congenital. It may penetrate through the hyothyroid membrane (external) or into the false cords (internal). Sometimes the two types are combined. According to an extensive roentgenographic survey, the lesion exists in about 5 per cent of all Europeans. A 37 year old man noticed a swelling on the right side of his neck. Dyspnea and dysphagia were not present. The swelling disappeared with a slight whistling noise under pressure from the surface and refilled under conditions of cough. A roentgenogram confirmed the diagnosis of laryngocele. Excision was performed, and the pedicle of the sac could be traced to its permeation through the hyothyroid membrane. Histologic examination of the sac revealed a single layer of ciliated columnar epithelium supported by loose connective tissue.

LEDERER, Chicago. [ARCH. OTOLARYNG.]

PATHOGENESIS OF CONGENITAL INSPIRATORY STRIDOR. FRANZ ANGYAL, Pract. oto-rhino-laryng. **3**:129 (Aug.) 1940.

The author describes a case of congenital inspiratory stridor in a child 2½ years old, who subsequently died of bronchopneumonia. Autopsy revealed marked

folding of the epiglottis and enlargement of the aryepiglottic folds. These seemed to form flaps and so caused marked narrowing of the aditus of the larynx. There was complete absence of musculature in the aryepiglottic fold. In his opinion, there was a congenital alteration of the larynx with exaggeration of the infantile type, and the absence of the muscle in the aryepiglottic fold was definitely the pathologic basis for the condition.

PERSKY, Philadelphia. [ARCH. OTOLARYNG.]

OTITIS MEDIA AND MASTOIDITIS OF DEHYDRATED INFANTS. ZOLTÁN, Orvosi hetil. **84**:342 (July 6) 1940.

Parenteral dehydration can be caused very often by otitis media or latent mastoiditis in infancy. In these cases the pediatrician and the otologist should determine together the cause of the dehydration. One should operate much earlier than usual, even if the otologic symptoms are not so prominent as they are when the general condition shows that the dehydration must be caused by a cryptogenic focus.

GÖTTCHE, Budapest, Hungary.

INDICATIONS FOR OTOLOGIC OPERATIONS FROM THE STANDPOINT OF THE PEDIATRICIAN. A. FLESCH, Orvosi hetil. **84**:489 (Sept. 21) 1940.

It is unquestionable that occult mastoiditis is much more common in infancy than has been thought. In cases of infantile atrophy, dystrophy or dehydration one should always think of the possibility of otitis media or mastoiditis. The ears should be examined, and if otitis is present myrngotomy should be performed. If in spite of myringotomy the condition does not show any improvement and one cannot find any other focus of infection, antrotomy should be performed. It is advisable to operate on both antrums at once. If the otoscopic examination does not show any pathologic changes one should refrain from any surgical intervention. The author cannot agree with the extremists who wish to operate even when pathologic changes in the ears cannot be found. In cases of pneumonia even if there is otitis media one should wait, except when the symptoms of mastoiditis are evident.

GÖTTCHE, Budapest, Hungary.

EXAMINATION OF THE AUDITORY FUNCTIONS OF SCHOOL CHILDREN IN THE COUNTRY. P. BELGRAVER, Nederl. tijdschr. v. geneesk. **84**:4359 (Nov. 9) 1940.

School children among the rural population in certain districts of the Netherlands were examined for their hearing of the whispered voice. It was found that the number of children in need of special teaching for impaired hearing was considerably higher than in the large towns, especially than in Amsterdam. This fact should be taken into account in determining the number of special schools required for this purpose. By greatly individualized care on the part of the teacher of the child with defective hearing, the results of teaching such children in ordinary schools can also be improved. As this possibility will remain an exception, in the rural districts special schools for children with defective hearing can be anticipated by means of intensifying the supervision by school medical officers and extension of the possibility of attending otologists' clinics. The establishment of ambulant clinics deserves considerations for some parts of the Netherlands.

VAN CREVELD, Amsterdam, Netherlands.

Diseases of Lungs, Pleura and Mediastinum

ASTHMATIC BRONCHITIS FOLLOWING CHRONIC UPPER RESPIRATORY INFECTION: A FIVE YEAR STUDY OF 235 CONSECUTIVE CASES SEEN IN PRIVATE PRACTICE. LEE BIVINGS, J. A. M. A. **115**:1434 (Oct. 26) 1940.

Asthmatic bronchitis, occurring usually in undernourished, anemic children with chronic sinusitis and other infections of the upper respiratory tract, is to be differentiated from asthma on a definitely allergic basis. In the 235 cases

presented, evidence of allergy, such as a significant history, eosinophilia of nasal secretion or positive results of blood and skin tests, was absent, but there was an increased reaction to the autogenous streptococcus, staphylococcus or other organism found.

Symptoms were quite uniform: cough, loss of appetite and weight, foul breath, recurring colds, nausea and occasionally sweating, with findings of anemia, post-nasal drip and nasal secretion, coated tongue and bronchitis with or without wheezing.

Treatment was directed toward eradicating the anemia and nasal infection and developing resistance by injections of an autogenous vaccine.

HEERSMA, Kalamazoo, Mich.

PNEUMONIA IN CHILDREN TREATED WITH SULFAPYRIDINE. New York State J. Med. **40**:1662 (Nov. 15) 1940.

Reports of 357 children with pneumonia treated with sulfapyridine (2-[para-aminobenzenesulfonamido]-pyridine), with a gross mortality of 3 per cent, are presented. One and one-half grains (0.1 Gm.) of sulfapyridine per pound (0.5 Kg.) of body weight was administered for the first twenty-four hours; then ¾ grain (0.05 Gm.) per pound of body weight was administered until the patient had been afebrile for about three days. The drug was powdered and suspended in about 1 ounce (30 cc.) of water for oral administration. The optimum blood level was found to be from 4 to 4.5 mg. per hundred cubic centimeters.

Sulfapyridine shortens the course of pneumonia by three to five days and "is innocuous," complications from the drug being of minor character. In 11 of the cases the course of pneumonia was unaffected by the drug.

AIKMAN, Rochester, N. Y.

CONGENITAL CYSTS OF THE LUNG AND EMPHYSEMA FROM BRONCHIAL OBSTRUCTION IN A CHILD. R. DEBRÉ, M. LAMY and J. MARIE, Presse méd. **48**:913 (Nov. 19) 1940.

There are similarities in the pictures produced by congenital cysts of the lungs and emphysema from bronchial obstruction. Usually a congenital cyst produces a crisis of dyspnea as its first symptom. Physical signs are those of a pneumothorax, with the heart and mediastinum displaced to the sound side. Roentgen examination shows a clear pulmonary field with vascular shadows, which are never seen in pneumothorax. The clinical course varies. A large cyst may remain static for years, with no effects on the general health, or suppuration or hemorrhage into the cyst may occur.

Emphysema may be of two types. The first involves a whole lobe, because of a bronchial obstruction acting as a ball valve. The physical signs are those of pneumothorax, and roentgen ray examination often reveals the obstruction. This type of emphysema may be nearly impossible to differentiate from a large congenital cyst except by study of the concomitant signs and the evolution of the condition. Emphysema is accompanied by atelectasis and disappears when the obstruction is removed. In the second type of emphysema, smaller bronchi are involved, and a bullous emphysema is produced. This is usually a complication of an acute pneumonic process. During the late course of a pneumonia fever returns, with a mild cough and dyspnea. Physical signs are lacking, and roentgen ray examination establishes the diagnosis. The cavities may become very large, may become infected, may produce a pneumothorax or may pass into a chronic state.

The only sure differentiation of some of these emphysematous lesions from cysts is in the disappearance of the lesion. If the lesion appears in a previously healthy lung it is bound to be emphysematous. Any association with atelectasis is in favor of emphysema. Often only long study will differentiate the two conditions.

DAFFINEE, Boston.

ASTHMA AND DISEASES OF THE HEART. LEON UNGER, Prensa méd. mex. **5**:211 (Dec. 15) 1940.

Does a continual bronchial asthma lead to heart disease? From the theoretic point of view, it might be believed that the right ventricle would enlarge, especially when there is associated emphysema. Seventy-four cases of bronchial asthma were cited; the patients had had asthma for from one to forty years, and some had chronic emphysema and bronchitis besides the asthma. Patients with high arterial tension, nephritis and evident cardiac disease were not included. The electrocardiograms in the 74 cases showed in a third of them an R wave in lead III which was superior to normal and in some an R wave in lead I which was lessened. No other abnormality was found. Thus it was concluded that from the clinical point of view and according to electrocardiographic evidence there is no disease of the heart caused by bronchial asthma. Clinical experience has been that patients with asthma do not have cardiac disease, however long or severe the asthma may be.

For the asthma attack the best remedy is epinephrine hydrochloride by hypodermic. The dose is 0.25 to 1 cc. of a 1:1,000 solution. This dose may be repeated in three to four hours, in a different location each time. Other treatments are anesthesia, with ether by rectum or inhalation, or theophylline with ethylene diamine.

Between attacks the physician should try to find the cause. Careful history taking and cutaneous tests in general will ascertain the cause. The best results are obtained when the cause can be found and cured. For cardiac asthma the author gives morphine in doses of 0.01 Gm. or more.. GIFFEN, Toledo, Ohio.

GRIPPAL TRACHEOBRONCHITIS AND ITS TREATMENT. R. PERWITZSCHKY, Ztschr. f. Hals-, Nasen- u. Ohrenh. **47**:1 (Aug.) 1940.

Perwitzschky reports 5 cases of acute tracheobronchitis following grippal infection which was characterized by marked difficulty in breathing, both in the inspiratory and in the expiratory phase. In each of his cases the characteristic stridor was definite. The upper respiratory tract was essentially normal, but when a laryngeal examination was possible, he found a pseudomembrane which covered the entire lining of the trachea and the bronchi. Although this pseudomembrane was easily removed, there was a marked tendency toward crust formation. This was noted particularly in the cases in which tracheotomy had been performed.

He discusses the pathologic and the bacteriologic aspects of these membranes and recommends as the ideal methods of treating this malady the administration of morphine and anastil (an expectorant containing guaiacol) and the use of steam inhalations and of warm oily sprays directed into the trachea.

The prognosis is usually grave, particularly for younger children. Tracheotomy usually favors the drying of the secretion with formation of crusts, which may occlude the entire lumen and produce a cast of either the trachea, the bronchi or both. Some of these casts may be so extensive as to occlude the lumens of these structures completely.

In conclusion, Perwitzschky states that the course of tracheobronchitis following grip is so characteristic that the disease must be differentiated from other forms of tracheitis and diphtheria.

PERSKY, Philadelphia. [ARCH. OTOLARYNG.]

HAEMOPHILUS INFLUENZAE AND INFLUENZA ULTRAVIRUS WITH RELATION TO PURULENT BRONCHITIS. J. MULDER, Nederl. tijdschr. v. geneesk. **84**:2806 (July 27) 1940.

The occurrence of Haemophilus influenzae was studied in common purulent bronchitis. This organism may be found in purulent sputum of patients who clinically give an impression of isolated common purulent bronchitis and in whom the influenza virus of Smith, Andrews and Laidlaw is not found. It is probable that the group of Haemophilus influenzae is the most frequent cause of primary and secondary acute and chronic purulent bronchitis, capillary bronchitis. Further

study will show how far in primary acute purulent bronchitis and bronchiolitis also other unknown respiratory ultraviruses have significance as pacemaker of the process. This is, however, regarded to be highly improbable for the greater part of the cases.

VAN CREVELD, Amsterdam, Netherlands.

PNEUMONIA IN CHILDHOOD TREATED WITH SULFAPYRIDINE. A. VAN ORMONDT, Nederl. tijdschr. v. geneesk. **84**:3298 (Aug. 24) 1940.

During fifteen months 72 children with pneumonia were admitted to the Binnengasthuis at Amsterdam, Netherlands. Of these, 49 with serious conditions were treated with sulfapyridine (2-[paraaminobenzenesulfonamido]-pyridine); 6 of them died. In 2 of these 6 the disease was complicated by a fibrinous pericarditis, and in 2 others there was mongolism, complicated by heart failure. In the untreated (control) group the condition was mild. Clinical improvement within forty-eight hours after the treatment was started was effected in 26 of the group of 49, whereas 4 children of the control group showed improvement at that time. Complications like anemia and granulocytopenia did not arise. Anorexia and vomiting were observed in some cases, and slight psychotic symptoms were noticed once. Frequently repeated examination of the blood is strongly recommended during sulfapyridine treatment.

VAN CREVELD, Amsterdam, Netherlands.

PSEUDOCAVITIES IN PNEUMONIA IN CHILDHOOD. E. A. TILLEMA, Nederl. tijdschr. v. geneesk. **84**:3666 (Sept. 21) 1940.

Of late an increased interest can be observed for the so-called pseudocavities in the lung occurring now and then, especially in young children who just have had pneumonia. The author discusses 2 observed cases. The formation of the pseudocavities is explained by the occurrence of localized bullous emphysema. There is a discussion of the differential diagnosis in relation to other observations found in the literature.

VAN CREVELD, Amsterdam, Netherlands.

Diseases of the Gastrointestinal Tract, Liver and Peritoneum

ACUTE APPENDICITIS IN CHILDREN: A CLINICAL STUDY OF MORE THAN 1,000 CASES. EDWIN M. MILLER, EGBERT H. FELL, CLAYTON BROCK and M. C. TODD, J. A. M. A. **115**:1239 (Oct. 12) 1940.

Over 1,000 patients with appendicitis were treated during a four year period at the Cook County Children's Hospital, Chicago. Of these 629 with simple, unperforated appendixes were immediately operated on, with no deaths. The appendicitis in 228 was of longer standing, and examination on admission showed evidence of localization of an abscess. In 25 the abscess was drained; in the others it either resolved or ruptured spontaneously. There were 5 deaths, or 2.5 per cent mortality. The controversial group consisted of those in varying and undetermined states of spreading peritonitis. The authors leaned toward the course of surgical intervention in all of these to eliminate the source of infection and establish drainage if needed. Special emphasis was laid on preoperative preparation, such as lavage, establishment of fluid and mineral balance, replacement of plasma protein by blood transfusion and culture studies. Of 25 of these patients treated conservatively 80 per cent died, while in the remaining 28 the mortality was 12.8 per cent.

HEERSMA, Kalamazoo, Mich.

CELIAC DISEASE. I. SRIBMAN, Rev. Soc. de pediat. de La Plata **1**:88 (Nov.-Dec.) 1940.

A case of celiac disease is presented, and the symptoms, pathologic changes, roentgen ray observations and treatment of the condition are discussed. No definite therapeutic regimen is applicable in all cases of this disease.

HIGGINS, Boston.

HEPATIC COMPLICATIONS DURING TREATMENT WITH SULFAPYRIDINE. K. GREINER, Klin. Wchnschr. **20**:97 (Jan. 25) 1941.

In each of 2 cases there was a hepatic lesion after treatment with sulfapyridine. The first patient was a 5 year old girl, weighing 17.5 Kg., who because of lobar pneumonia received 3.75 Gm. of sulfapyridine in five days. The eighth day an icterus developed and leucine and tyrosine with 40 to 50 erythrocytes were found in the urine. Administration of the drug was immediately stopped; the child received a purely carbohydrate diet, and the lesion disappeared in six days. The other patient was a 5 year old girl, weighing 16 Kg., who was treated with sulfapyridine because of meningococcic meningitis. She received 20.75 Gm. of sulfapyridine in eleven days. When the symptoms of meningitis were beginning to disappear jaundice with vomiting and hepatic sensitivity suddenly developed. The jaundice lasted two weeks and was much more severe than in the first case. The doses of sulfapyridine were not large in either case; therefore, one must think of the possibility of hypersensitivity to the drug.

GÖTTCHE, Budapest, Hungary.

PERMANENT BOUGIE IN THE TREATMENT OF ACUTE CORROSIVE ESOPHAGITIS. S. BELINOFF, Monatschr. f. Ohrenh. **74**:587 (Dec.) 1940.

Clinically, three forms of acute corrosive esophagitis can be distinguished—slight, mild and severe. The slight form (10 per cent incidence), in which only a little poison gets into the esophagus, requires no treatment. The severe form (27 per cent incidence) is to be treated only with palliative measures, as death ensues in a short time. The third form (63 per cent incidence) is suitable for treatment. The author believes that in all cases of acute esophageal burns esophagoscopy is indicated and is of no danger if executed properly. Early blind bougie treatment, performed without previous intraesophageal examination as to the localization and severity of the lesion, may prove very dangerous. The present day treatment by daily dilation with hard bougies (Bouchard) and Salzer's method are not advisable, as the damaged membrane is daily irritated anew. A permanent bougie, as advised by Gersuny sixty years ago, can be brought in position by means of external pharyngotomy and can remain in place for weeks. This was done by the author in 5 cases, with excellent results. No reflexes are produced, as the pharynx is eliminated. Feedings can be given through the bougie, and good drainage is provided thereby to obviate possible periesophagitis and mediastinitis.

LEDERER, Chicago. [ARCH. OTOLARYNG.]

ULCEROUS COLITIS TREATED WITH SULFAPYRIDINE. NANNA SVARTZ and S. KOLLNER, Nord. med. **8**:1935 (Nov. 9) 1940.

The authors report experiments on the sulfapyridine treatment of ulcerous colitis in children and young adults. In some cases recovery occurred rapidly. In other cases no improvement was observed. At present no plausible explanation can be given as to the excellent effect of sulfapyridine in some cases of ulcerous colitis and the ineffectivity of this drug in other cases.

WALLGREN, Göteborg, Sweden.

RELAPSES OF INTUSSUSCEPTION IN INFANTS. P. HELLSTRÖM, Svenska läk.-tidning. **37**:1928 (Nov. 29) 1940.

Of 77 cases of acute intussusception in infants treated at the Children's Hospital in Göteborg, Sweden, in 9 there was one relapse or more. The relapses were more frequent among infants treated without surgical intervention. The reason why there is a relapse in some cases and not in others is obscure. Enteritis as a probable factor is discussed.

WALLGREN, Göteborg, Sweden.

CHRONIC INTUSSUSCEPTION IN A GIRL OF FOUR YEARS. ALLAN V. HENRIQUES, Ugesk. f. læger **102**:1272 (Nov. 28) 1940.

The girl had some years previously been treated for primary pulmonary tuberculosis. She was first seen on February 8. She had then suffered from abdominal pains and loose stools for three weeks. On examination a large tumor was felt. This was thought to be due to tuberculous mesenteric glands, but this tentative diagnosis was soon dropped. The tumor remained unchanged, and the pains continued and were absent for only short periods. Six weeks after admission a roentgenograhic examination showed that the tumor was due to an intussusception. The girl was successfully treated surgically.

WALLGREN, Göteborg, Sweden.

CONSTIPATION IN BREAST-FED BABIES TREATED WITH TAP WATER. EINAR SYLVEST, Ugesk. f. læger **102**:1273 (Nov. 28) 1940.

The administration of some teaspoonfuls of ordinary tap water in repeated doses produced evacuation in constipated breast-fed infants.

WALLGREN, Göteborg, Sweden.

PECULIAR COMPLICATIONS CAUSED BY A FOREIGN BODY IN THE ESOPHAGUS. P. VAN DER MEULEN, Nederl. tijdschr. v. geneesk. **84**:2639 (July 13) 1940.

A ring with two projecting points was removed from the esophagus of a girl of 5 years; it had been in that structure no less than two years, during which time there were complaints of asthma, bronchitis and laryngitis and tonsillectomy and adenotomy were performed. At extraction a perforation was caused (emphysema on the roentgenogram). Treatment was conservative. An esophagotracheal fistula developed, distinctly demonstrable with contrast material. Remarkable was the formation of new bone in front of the cervical vertebral bodies, probably as a result of periostial irritation by the foreign body. There was an abnormality of the sixth cervical vertebra.

VAN CREVELD, Amsterdam, Netherlands.

INVAGINATION OF THE INTESTINE. J. P. DE JONG, Nederl. tijdschr. v. geneesk. **84**:3502 (Sept. 7) 1940.

A review of 252 cases of intestinal intussusception observed in the surgical hospital of the University of Groningen, Netherlands, is given. Emphasis is laid on the great importance of early recognition of the disease, as this will mainly contribute to the improvement of results. Conditions lasting longer than two weeks were regarded as chronic; these were observed in 12.3 per cent of all cases. As regards the localization of the invagination at different ages, in babies ileocoecal invagination occurrd in 88.3 per cent of all cases. With increasing age the incidence of ileac invagination increased. Roentgen ray examination is recommended only when the diagnosis is uncertain. In 2 cases heredity perhaps played a predisposing factor. In 2 cases a relapse occurred.

VAN CREVELD, Amsterdam, Netherlands.

ABDOMINAL PAIN IN CHILDHOOD. B. E. J. H. BECKING, Nederl. tijdschr. v. geneesk. **84**:4112 (Oct. 26) 1940.

In this clinical lecture the author gives several practical examples of the difficulties encountered in the interpretation of abdominal pain in childhood. The value of absence of abdominal reflexes for the diagnosis of appendicitis is stressed.

VAN CREVELD, Amsterdam, Netherlands.

Nervous Diseases

DILANTIN SODIUM: ITS INFLUENCE ON CONDUCT AND ON PSYCHOMETRIC RATINGS OF INSTITUTIONALIZED EPILEPTICS. ALEXANDER T. ROSS and VIRGINIA JACKSON, Ann. Int. Med. **14**:770 (Nov.) 1940.

The authors have reviewed the cases of 73 patients who have been given this drug for from twelve to eighteen months. They have paid special attention to the conduct and intelligence quotients of these patients. In 65 per cent of them they found marked reduction in the incidence of seizures, and 50 per cent showed marked improvement in conduct. The authors felt, however, that the drug had no significant influence on the intelligence ratings. GARD, Galveston, Texas.

DIFFERENTIAL DIAGNOSIS OF VARIOUS FORMS OF ENCEPHALITIS. JOHN A. TOOMEY, J. A. M. A. **115**:1985 (Dec. 7) 1940.

The encephalitides are classified and the differential characteristics discussed. Differential diagnosis of the eleven types rests on (1) appearance, age, sex and fate of the patient, (2) temperature, pulse and respiratory rate, (3) history of the illness, especially as regards its onset and course, (4) neurologic changes, (5) spinal fluid examination and (6) the results of immunologic tests (the only positive evidence).

In conclusion the author summarizes the differential points of each type.

HEERSMA, Kalamazoo, Mich.

SULFAPYRIDINE AND ITS SODIUM SALT IN THE TREATMENT OF MENINGITIS DUE TO THE PNEUMOCOCCUS AND HAEMOPHILUS INFLUENZAE. JOSEPHINE B. NEAL, EMMANUEL APPELBAUM and HENRY W. JACKSON, J. A. M. A. **115**:2055 (Dec. 14) 1940.

Previous methods of treatment with serums and sulfanilamide resulted in almost no recoveries. In 30 cases of pneumococcic meningitis there were 10 recoveries and in 29 cases of influenzal meningitis 14 recoveries. Although serum was given also, the beneficial results seemed to be due to sulfapyridine, given orally or rectally, or its sodium salt, given intravenously or intraspinally.

HEERSMA, Kalamazoo, Mich.

INFLUENZAL MENINGITIS: REPORT OF TWO CASES WITH RECOVERY: ONE CASE COMPLICATED BY PAROXYSMAL TACHYCARDIA. ERNEST L. NOONE and PATRICK J. KENNEDY, J. A. M. A. **115**:2060 (Dec. 14) 1940.

Two 5 year old children were treated with serum, sulfapyridine and later sulfathiazole for influenzal meningitis. In 1 case the disease was complicated by shock after intravenous administration of sulfapyridine and later by a severe reaction and an oral membrane; in the other, by paroxysmal tachycardia. Although the disease was very severe, both children recovered. The authors advocate early, vigorous and prolonged treatment. HEERSMA, Kalamazoo, Mich.

LATE RESULTS OF OPERATION FOR SPINA BIFIDA. FERNANDO VALDEZ VILLARREAL, Prensa méd. mex. **11**:198 (Nov. 15) 1940.

The symptoms of spina bifida consist of (1) a morphologic malformation manifested by the presence of a tumor in the midline of the vertebral column and (2) functional disturbances which vary with the lesion. With the more benign condition—unfortunately the rarer kind—such as the one presented here, the patient may live to adult age, always with the danger of rupture of the meningeal sac, with all its attendent consequences.

The author presents the case of a patient afflicted with spina bifida posterior in the lumbar region who has lived without any accident to adult age. An immediate operation was successfully performed, without the appearance of any of

the complications which often occur shortly after operation. These complications, particularly spinal fistula, were avoided by postoperative care: Trendelenburg position and intravenous injections of a hypertonic solution to lower the tension of the cerebrospinal fluid. The patient has been seen every six months for the past five years, and up to now the tension of the cerebrospinal fluid, the functioning of the nervous system and the psyche of the patient have remained normal. The author believes that the patient remains completely free from complications.

GIFFEN, Toledo, Ohio.

SPASMODIC QUADRIPLEGIA, WITH FAMILIAL IDIOCY AND DEAF MUTISM. C. JAKOB and A. SCARAVELLI, Rev. neurol. de Buenos Aires **5**:283 (Oct.-Dec.) 1940.

Jakob and Scaravelli report the occurrence of these abnormalities in a family of 8 brothers and sisters. The parents are farmers of normal intellect and education for their social sphere. They are nonconsanguineous, nonsyphilitic and nonalcoholic. Some of the father's brothers had mental abnormalities and died unmarried. The normal brothers and sisters of the father had normal children. The family of the mother is normal. The couple had 10 children, all of whom had a normal delivery. One of the children was apparently normal up to the age of 15 years, when she had an epileptic attack, fell from a horse and died. Another was apparently normal up to the age of 10 months, when he stopped growing and lived for twenty-three years in his cradle, an idiot. Another was an idiot with epilepsy from early childhood and died at the age of 16 years. Seven between the ages of 30 and 45, are living. None of the children had meningitis in infancy or childhood. All have spasmodic quadriplegia, deaf-mutism, idiocy and epilepsy. Some crawl on their knees, and some exhibit strabismus. The authors made an anatomic study of brains of human embryos and anatomopathologic studies of brains of cadavers of idiots with congenital spasmodic quadriplegia, epilepsy and mutism. The brains of idiots exhibited symmetric tuberous dysplasia or hypoplasia of the rolandic areas, symmetric hypoplasia of the rolandic, temporal and parietal areas and of the pyramids and corpus callosum and, in some cases, microgyria and pachygyria. The authors believe that these abnormalities are due to symmetric lack of development of the rolandic, parietal and temporal areas during the second and third months of embryonic development, with consequent establishment of a condition of the nerve tissues which simulates corticosubcortical tuberous sclerosis, early hypoplasia of the pyramids and corpus callosum and secondary hypoplasia of the parietal and frontal lobes. Heredity is a factor in the absence of other pathogenic factors. The existence of parallel recessive neurogenic defects in both parents is a plausible explanation of the abnormalities in the family reported by the authors.

J. A. M. A.

TREATMENT OF SEVERE SYDENHAM CHOREA BY STERILE ABSCESS FORMATION. J. J. CRICCO and L. O. MAGISTOCHI, Rev. Soc. de pediat. de La Plata **1**:106 (Nov.-Dec.) 1940.

Four children with severe Sydenham chorea which did not respond to salicylates were treated by an injection of 2 cc. of turpentine into the anterior part of the thigh. In each case a large sterile abscess formed and the symptoms of chorea were relieved. One of the children had a recurrence of symptoms and was again given an injection of turpentine, with therapeutic relief. The rationale of the treatment was based on the beneficial effects of sterile abscess formation in cases of epidemic encephalitis.

HIGGINS, Boston.

A CONVULSION SYNDROME ACCOMPANIED BY HIGH FEVER OF AN ACUTE AND GRAVE NATURE: A CONTRIBUTION TO THE CLINICAL KNOWLEDGE OF ACUTE CEREBRAL SWELLING. H. FORSTER, Ztschr. f. Kinderh. **62**:152 (Oct. 17) 1940.

Characteristics of the syndrome are: (1) tonic and clonic convulsions becoming progressively worse, (2) hyperpyrexia and unconsciousness and (3) death in a

short time (average, twenty-four to forty-eight hours). Convulsions may occur in connection with acute infectious diseases or in perfectly healthy children. In the latter cases previous damage to the cerebrum is assumed. Practically all cases occur in infants and small children.

Autopsy in most cases shows cerebral swelling.

SIEMSEN, Chicago.

REPEATED CONGENITAL HYDROCEPHALUS. K. KOVÁTS, Orvosi hetil. **84**:531 (Oct. 12) 1940.

A woman was gravid three times, and from each pregnancy a fetus with enormous hydrocephalus was born. The hydrocephalus could be demonstrated before birth each time by roentgen examination. The parents were first cousins. Later a fourth child was born who was normal.

GÖTTCHE, Budapest, Hungary.

THE PATHOLOGY OF "ENCEPHALOSIS" IN CHILDHOOD. S. BLAZSÓ and J. KRAMÁR, Orvosi hetil. **84**:599 (Nov. 30) 1940.

A 3 month old infant had a nevus, which was treated with thermocauterization. Two days after the treatment the infant became ill with symptoms of encephalitis. Three weeks later, when the condition of the infant became better, the thermocauterization was repeated, and the infant again showed symptoms of encephalitis. This procedure was repeated three times and the infant always showed encephalitic symptoms. The examinations showed all three times that when the symptoms of encephalitis developed the blood pressure rose and retention of water could be observed. At this time a toxic substance could be demonstrated in the cerebrospinal fluid, and this could be proved by the dog experiment of Marx. The essence of the experiment of Marx is that if cerebrospinal fluid with toxic substance is injected into the ventricles of a dog, the blood pressure rises, the water is retained and the urine shows erythrocytes and cylinders. By the destruction of the tissues toxic substances can develop which can cause toxic symptoms in the nervous system. This clinical picture may be named "encephalosis." This name originates from the histologic observations, which show that not symptoms of inflammation but symptoms of degeneration are to be found in the brain; therefore, the correct name of this pathologic picture is "encephalosis."

GÖTTCHE, Budapest, Hungary.

SULFAPYRIDINE TREATMENT OF PNEUMOCOCCIC MENINGITIS. O. SVAAR-SELJESAETER, Tidskr. f. d. norsk. lægeforening. **60**:1069 (Dec. 15) 1940.

The author reports 2 cases of primary pneumococcic meningitis in boys 14 and 1½ years of age. Both of the boys were treated with large doses of sulfapyridine (2-[paraaminobenzenesulfonamido]-pyridine). The results were recovery in the first case (35 grains [2.3 Gm.] of sulfapyridine in seven days) and death in the second case (18 grains [1.16 Gm.] of sulfapyridine in six days).

WALLGREN, Göteborg, Sweden.

SYMPTOMS AND SURGICAL TREATMENT OF SPINA BIFIDA OCCULTA. W. F. SUERMONDT, Nederl. tijdschr. v. geneesk. **84**:2624 (July 13) 1940.

In this clinical lecture 4 surgically treated patients with spina bifida occulta are briefly described; 2 totally recovered and 2 improved a good deal. In the author's opinion surgical intervention is indicated when clinical and roentgenologic examination show that there exists pressure or stretching of the lower part of the dural sac and of the cauda equina.

VAN CREVELD, Amsterdam, Netherlands.

TREATMENT OF EPILEPTIC PATIENTS WITH DILANTIN SODIUM. J. J. H. M. KLESSENS and H. J. N. DEKKERS, Nederl. tijdschr. v. geneesk. **84**:2653 (July 13) 1940.

Dilantin sodium appears to be a valuable acquisition for the treatment of persons subject to epileptic seizures. Use of this drug, however, requires very rigid supervision, both in view of its high toxicity for the cells of the organism and in view of the risk that the agent may produce an inverse effect; sometimes it makes the attacks worse, and sometimes when no further improvement is obtained stopping the administration of the apparently useless drug brings about a serious increase in the seizures, an event experienced by the author himself.

VAN CREVELD, Amsterdam, Netherlands.

EXPERIENCES IN TREATING EPILEPTIC PATIENTS WITH DILANTIN SODIUM. J. J. H. M. KLESSENS, Nederl. tijdschr. v. geneesk. **84**:2658 (July 13) 1940.

The author gives his experiences with the use of dilantin sodium in 8 patients with epilepsy, 3 of whom were children. The frequent toxic and untoward side effects make rigid supervision necessary. The success is, however, only moderate and often of short duration.

VAN CREVELD, Amsterdam, Netherlands.

DERANGEMENTS OF SPEECH IN POSTENCEPHALITIC PARKINSONISM. F. GREWEL, Nederl. tijdschr. v. geneesk. **84**:3063 (Aug. 10) 1940.

The results of a clinical and an experimental phonetic study of the derangements of speech in postencephalitic parkinsonism are reported. The disturbances can be explained by impaired adjustment of motility, diminished extension, propulsivity, rigidity and especially derangement of muscular coordination characteristic of this disease, which leads to a pseudodysdiadokokinesis to which the respiratory muscles and the muscles of phonation and articulation are also liable.

VAN CREVELD, Amsterdam, Netherlands.

CONVULSIONS WHICH REQUIRE IMMEDIATE TREATMENT. E. GORTER, Nederl. tijdschr. v. geneesk. **84**:3472 (Sept. 7) 1940.

As an instance of convulsions which require immediate treatment the author in this clinical lecture describes the case of a boy 1½ years old who one day after a fall on the back of the head had convulsions as the first symptom of illness. The diagnosis remained uncertain, but unexpectedly an extreme hypoglycemia was found. After intravenous injection of dextrose solution complete recovery occurred. No constant changes in the sugar metabolism could be found. At the age of 5 days this boy had had a severe convulsion. In this relation hypocalcemia of the newborn is mentioned as a cause of convulsions which require immediate treatment; as another cause of this kind of convulsions cerebral edema is mentioned.

VAN CREVELD, Amsterdam, Netherlands.

INTRACEREBRAL HEMATOMAS. W. G. SILLEVIS SMITT, Nederl. tijdschr. v. geneesk. **84**:4500 (Nov. 16) 1940.

Two types of intracerebral hematomas can be distinguished: capillary hemorrhages and the large hemorrhages, practically always combined with destruction of brain substance. It is a problem how these large intracerebral hematomas occur after a slight trauma and with absence of vascular disease.

In this clinical lecture several cases of sometimes extensive intracerebral hematomas observed in formerly healthy children and mostly after a slight trauma are discussed. Sometimes the hematoma can be explained in this way: A slight trauma gives rise to a hemorrhage in an already existing tumor of the brain rich in blood vessels which has not yet caused neurologic symptoms. The indications for operative treatment are discussed.

VAN CREVELD, Amsterdam, Netherlands.

Psychology and Psychiatry

AMAUROTIC IDIOCY AND RELATED CONDITIONS. A. HAGEDORN, Am. J. Ophth. **23**:735 (July) 1940.

Hagedorn discusses amaurotic family idiocy and certain diseases associated with abnormal lipid metabolism, namely, Niemann-Pick, Gaucher and Schüller-Christian disease, mainly from the standpoint of pathology. He considers these related conditions, pointing out that Tay's sign has been noted in 6 cases of Niemann-Pick disease.

W. S. REESE. [ARCH. OPHTH.]

PSEUDOSILLINESS AND PSEUDOBACKWARDNESS. H. A. VAN DER STERREN, Nederl. tijdschr. v. geneesk. **84**:3582 (Sept. 14) 1940.

The diagnosis of backwardness sometimes is very difficult to make. The author draws attention to the importance of pseudosilliness and pseudobackwardness and the difficulties of differentiating these conditions. The ordinary tests for the determination of intellect are often unsuitable, and their results are often valued too absolutely. Elaborate inquiry into the medical and psychologic anamnesis, a thorough mediconeurologic examination, good testing and, additionally, a Rorschach test and a search for neurotic factors are all necessary. This is illustrated with the report of 3 cases.

VAN CREVELD, Amsterdam, Netherlands.

Diseases of the Genitourinary Tract

THE SIGNIFICANCE OF PROTEIN METABOLISM IN THE NEPHROTIC CHILD. LEE E. FARR, J. Pediat. **17**:734 (Dec.) 1940.

Studies on nephrotic children indicated that on the average 2.5 Gm. of protein per kilogram ideal body weight was necessary to insure a positive nitrogen balance. Feeding a nephrotic child a diet with an optimum protein content did not regularly result in a rise in plasma protein concentration, even though the child were free of edema and in a state of positive nitrogen balance. Studies were made on children in acute clinical episodes, which were frequently accompanied by pneumococcic bacteremia and peritonitis and were almost uniformly preceded by a period of from one to two weeks in which the child was in a negative nitrogen balance although the diet remained optimal. These acute episodes whether accompanied by an infection or not have been termed attacks of nephrotic crises. These episodes occur most frequently in children with a plasma albumin content below 1 per cent. Studies on the plasma amino acids of these children showed a marked disturbance of amino acid physiology. A persistent plasma hypoaminoacidemia during the period of disease was found. Acute hypoaminoacidemia crises, when the level of plasma amino acid nitrogen fell below 2.5 mg. per hundred cubic centimeters (a value the author termed the critical level), accompanied and paralleled the clinical explosion of the nephrotic crisis. A sharp rise in plasma amino acids to above the critical level attended the sudden recovery of these patients. This fall in plasma amino acids occurred whether or not the crisis was accompanied by demonstrable infections but persisted longer in the presence of bacteremia and peritonitis. Farr concludes this discussion with a report on results obtained with amino acid solution in the form of an enzymatic casein hydrolysate given intravenously to nephrotic children.

RAUH, Cincinnati.

HYDROMETROCOLPOS IN INFANCY: CONGENITAL ATRESIA OF THE VAGINA WITH ABNORMALLY ABUNDANT CERVICAL SECRETIONS. PATRICK J. MAHONEY and JOHN W. CHAMBERLAIN, J. Pediat. **17**:772 (Dec.) 1940.

Hydrometrocolpos is characterized "by an atresia of the vagina and by an abnormally copious secretion of fluid into the vagina and uterus proximal to the point of atresia. This results in the formation of a pelvic and lower abdominal

cystic tumor, the pressure from which may be great enough to interfere with the flow of urine and intestinal contents."

The authors report 4 cases occurring in early infancy. A review of the literature is presented, along with methods of diagnosis and treatment.

RAUH, Cincinnati.

RENAL GLYCOSURIA: A HEREDITARY AND CLINICAL STUDY OF ONE FAMILY. S. GORHAM BABSON, J. Pediat. **17**:781 (Dec.) 1940.

This is a report of an American family "in which renal glycosuria has been transmitted through three generations as a dominant character.

"The eldest member, who has had glycosuria with normal fasting blood sugar levels for twenty years, has developed diabetes mellitus with a normal renal threshold.

"A rise in the renal thresholds for sugar to within normal limits has been observed in two cases [members of this family with renal glycosuria].

"Clinical studies are reported on a 4-year-old member of this family who exhibited ketonuria, mild acidosis, and a renal threshold for sugar below 50 mg. per cent."

RAUH, Cincinnati.

RENAL OSTEODYSTROPHY. P. GUYE and E. RUTISHAUSER, Presse méd. **48**:1035 (Dec. 17) 1940.

The relation between chronic nephritis and osseous disease is not at all clear. Guye and Rutishauser point out that the osseous lesions are not present throughout the entire skeleton, although the process of demineralization must take place all through the body. Careful study of an adult patient with polycystic kidneys, nephrosclerosis and renal osteodystrophy showed no reasons why certain locations were chosen. The authors suggest that local conditions must be responsible, in the presence of an abnormal mineral metabolism.

DAFFINEE, Boston.

A CASE OF ACUTE GLOMERULAR NEPHRITIS. H. P. DIAZ, Rev. Soc. de pediat. de La Plata **1**:124 (Nov.-Dec.) 1940.

A 22 month old girl had acute glomerular nephritis fifteen days after an infection of the respiratory tract. The case was unusual because of the extreme youth of the patient.

HIGGINS, Boston.

RENAL TUMORS IN INFANCY. P. DUDÁS, Orvosi hetil. **84**:209 (July 27) 1940.

Four cases of renal tumors in infancy are reported. In 3 of them the tumors were malignant (the ages of the children were 1, 2 and 2½ years). In 1 case surgical intervention was attempted, and the histologic examination showed a renal sarcoma of the embryonal type; in the other 2 cases the tumors were inoperable. The fourth case was that of a 5 month old infant who had a lymphangioma cysticum congenitum on the left side of the abdominal wall. This benign tumor was successfully treated surgically.

GÖTTCHE, Budapest, Hungary.

A CASE OF ALKAPTONURIA IN CHILDHOOD. Z. LELKES, Orvosi hetil. **84**:356 (July 13) 1940.

The author observed a 1 year old infant who had alkaptonuria from 3 months of age. The hereditary feature was present, the mother of the child having had alkaptonuria in her childhood, but it stopped when she was 12 years old. The fact that the alkaptonuria stopped at the beginning of puberty makes it possible that the disorder has some connection with endocrinal alterations.

GÖTTCHE, Budapest, Hungary.

TREATMENT OF GONOCOCCIC VAGINITIS OF GIRLS IN INFANCY AND CHILDHOOD. Z. SZENTKIRÁLYI and M. HAJNAL, Orvosi hetil. **84**:672 (Dec. 28) 1940.

It is well known that the treatment of gonococcic vaginitis in infancy and childhood with parenteral administration of the hormone of the corpus luteum (progesterone) gives very good results. The authors tried putting the progesterone in the form of liniment into the vagina of the girls and obtained very good results.

GÖTTCHE, Budapest, Hungary.

SULFANILAMIDE AND SULFAPYRIDINE AND NEPHRITIS. HENRIK F. LANGE, Nord. med. **8**:2549 (Dec. 21) 1940.

The author reports 15 cases of acute nephritis associated with scarlet fever in which sulfanilamide or sulfapyridine had been given on account of complications (pneumonia, erysipelas, etc.). During this treatment no untoward effect on the kidneys could be demonstrated. The author believes that the kidneys were benefited indirectly by this drug therapy, as the renal dangers arising from the complications were eliminated.

WALLGREN, Göteborg, Sweden.

Diseases of the Ductless Glands; Endocrinology

IMPORTANCE OF ASCORBIC ACID IN THE FUNCTION OF THE ADRENAL CORTEX. A. GIROUD, Presse méd. **48**:841 (Oct. 23-26) 1940.

The function of the adrenal cortex is dependent on several factors. The hypophysis and the genital glands produce hormones which can affect the adrenal glands. Vitamins, too, seem to play a role, and various authors have pointed out the effects of deprivation of vitamins A, B_1 and B_2. Ascorbic acid seems to be more intimately bound up with adrenal cortical function, and Giroud presents a series of experiments showing that the levels of ascorbic acid in cortical tissue correspond to levels of hormone content. When animals are kept on a diet deficient in vitamin C, both hormone and ascorbic acid values fall. Administration of ascorbic acid alone will cause both values to rise sharply. Autopsies prove that there is often a surprisingly low level of ascorbic acid present in the organs of the body. It is known that in certain infections and intoxications the ascorbic acid level falls markedly. These facts show that ascorbic acid (either alone or with extract of adrenal cortex) should be used in the treatment of infections or intoxications which may affect the adrenal cortex secondarily, as well as in those diseases which attack the adrenal primarily.

DAFFINEE, Boston.

INVOLVEMENT OF THE THYMUS IN MYASTHENIA GRAVIS PSEUDOPARALYTICA. C. BOMSKOV and G. MILZNER, Deutsche Ztschr. f. Chir. **254**:99 (Oct. 19) 1940.

Bomskov and Milzner investigated Adler's theory of involvement of the thymus in myasthenia by experimenting on some 120 rats and 30 guinea pigs both with the specific thymus hormone as well as with extracts prepared according to Adler's method. They arrived at the conclusion that if the endocrine system is involved it is not the thymus but the adrenal cortex impairment of which is primarily responsible for all myasthenic phenomena. Myasthenia is defined as abnormal muscular fatigue, demonstrable in spontaneous movements and on electrical stimulation. Anatomically nonspecific, so-called lymphocytic, infiltrations are most frequently observed in the muscles. According to Adler, the implantation of dog or calf thymus glands in dogs, the administration of certain thymus extracts and the injection of blood of myasthenic persons provoke grave myasthenia with complete prostration in some dogs. Adler also holds the view that myasthenia associated with exophthalmic goiter and adynamia observed in Addison's disease are true myasthenia, since Jolly's reaction is positive and prostigmine bromide effects prompt amelioration.

In their experiments the authors employed the specific thymus hormone and the extracts prepared according to Adler's formula in very high concentrations. Rats and guinea pigs were used instead of dogs because adrenalectomy regularly induces typical adynamia in these animals and thus makes them excellent material for cortical hormone experiments. In no case were the authors able by either method to induce myasthenic reactions. The authors believe that the discrepancy between Adler's and their results is due in part to the inadequacy of Adler's procedure. Several of his dogs died of pneumonia shortly after the test; abscesses were also observed after implantation. However, for them the crux of the experiments lies in the fact that Adler was unable, in spite of prolonged injections of thymus extract, to induce the clinical phenomenon of fatigue, specific for myasthenia. Adler, they think, also overestimated the diagnostic value of Jolly's reaction, for he found myasthenia in numerous cases of exophthalmic goiter, the frequency far exceeding that of all other investigators. The authors believe that there is no primary connection between myasthenia and the thymus gland. J. A. M. A.

PHYSIOLOGY OF THE FETAL THYROID GLAND. Z. LELKES, Orvosi hetil. **84**:493 (Sept. 21) 1940.

Three types of examination of the thyroid glands of fetuses can be made: (1) morphologic, (2) chemical (determination of the iodine content) and (3) biologic (examination of the influence of the fetal thyroid glands on the development of the amphibian). The results of the examinations of the fetal thyroid glands of animals cannot be applied wholly to human beings because these examinations undoubtedly show some activity of these glands, whereas activity of the fetal thyroid glands of human beings is problematic in the opinion of most examiners. The author thinks that his biologic examinations prove that the human thyroid glands also have some activity in the second half of intrauterine life.

GÖTTCHE, Budapest, Hungary.

CORRELATION OF CELLS IN THE ANTERIOR LOBE OF THE HYPOPHYSIS IN MAN. W. A. MANSCHOT, Nederl. tijdschr. v. geneesk. **84**:3782 (Sept. 28) 1940.

The author made an investigation on the correlation of cells in the anterior lobe of the hypophysis in man, according to the Rasmussen method (1929) in 10 cases; all patients had been suffering from greatly varying diseases. His results corresponded completely with those of Rasmussen. The chromophobe elements were as usual the most numerous; the basophilic cells were in all cases in the minority. The older view, not based on counting, but that the chromophobe cells are the smallest in number, is erroneous.

VAN CREVELD, Amsterdam, Netherlands.

ADRENAL TUMOR. G. O. E. LIGNAC, Nederl. tijdschr. v. geneesk. **84**:3880 (Aug. 31) 1940.

In this clinical lecture an adrenal tumor (a sympathogonioma) in a girl of 2 years with extensive metastases is described. The various tumors of the adrenals occurring in childhood are briefly discussed.

VAN CREVELD, Amsterdam, Netherlands.

ADRENAL HYPERPLASIA AND INTERRENAL INTOXICATION IN BABIES WITH AND WITHOUT PSEUDOHERMAPHRODITISM. C. VAN BEEK, Nederl. tijdschr. v. geneesk. **84**:4507 (Nov. 16) 1940.

The author describes a patient with pseudohermaphroiditism femininus externus with multiple malformations and hyperplasia of the adrenal cortex who came to autopsy at the age of 16 days. The prostate was lacking. The nature of adrenal hyperplasia in an infant with or without pseudohermaphroditism and the cause

of early death in many cases of this kind are considered in detail, and a survey of the literature is given. Probably the disorder is an abnormality transmitted by germinal fixation. It is further pointed out that hormonal interaction of mother and fetus may play a part, as is illustrated by a case of Addison's disease.

When at the time of birth there is a doubt as to sex, one may, especially when no vagina is seen, classify the child best as a boy. Diagnostic laparotomy and biopsy are seldom indicated; one should postpone them until the subject himself can decide about his sex. Not until then should plastic operation come into consideration.

VAN CREVELD, Amsterdam, Netherlands.

Diseases of the Muscles, Bones, Joints and Lymph Glands

AMYOTONIA CONGENITA (OPPENHEIM'S DISEASE). LUCILLE R. ANDERSON and DAVID L. REEVES, Bull. Los Angeles Neurol. Soc. **5**:210 (Dec.) 1940.

Anderson and Reeves report the case of a female infant 7 weeks old who had been limp and weak since birth. She was born spontaneously, at full term, and did not cry during the first twenty-four hours. Her weight at birth was 5 pounds 6 ounces (2,438 Gm.). Pneumonia occurred when she was 3 weeks old, after which her condition became worse. No other member of the family had been similarly afflicted. At examination the infant was pale and thin and exhibited inspiratory stridor. Respiration was purely diaphragmatic, and cyanosis appeared when the child cried. The body musculature was atonic; the head fell backward when she was lifted; the arms, though moving normally and without ataxia, were like pieces of rope, and the legs could be placed behind the head. There was secondary anemia; but the blood was cytologically normal, the spinal fluid showed no changes and the reaction to the tuberculin test was negative. The muscles responded feebly to faradic, but not to galvanic, stimuli. Death resulted from bronchopneumonia. Some of the muscle fibers were small and others large. Cross striations were usually scarcely visible, while some of the fibers had undergone hyaline degeneration. Grossly the spinal cord was normal, but microscopic examination showed that the cells of the spinal gray matter, both dorsal and ventral, were few, often without nuclear structure and vacuolated. Hemorrhages were also observed in the cord. The changes were more marked in some areas than in others.

MACKAY, Chicago. [ARCH. NEUROL. & PSYCHIAT.]

NEUROMUSCULAR DEVELOPMENT OF THE HUMAN INFANT AS EXEMPLIFIED IN THE ACHIEVEMENT OF ERECT LOCOMOTION. MYRTLE B. MCGRAW, J. Pediat. **17**:747 (Dec.) 1940.

"The purpose of this study has been to demonstrate successive changes in neuromuscular activities which culminate in the development of a mature, integrated, human gait. A total of 3,387 observations were made upon a group of 82 infants ranging in age from birth to 5 years. On the basis of these observations it was possible to select criteria which differentiated seven fairly distinct phases in the development of erect locomotion. Once the criteria were defined, it was possible to rate the accumulated observations in accordance with the phase representative of the mode of behavior described. These ratings reduced the data to a symbolic system so that curves showing the trend and duration of each phase could be obtained. . . .

"In determining the criteria of each phase, it was recognized that certain changes in overt behavior reflect reorganization of the neural centers involved in the activity. On the basis of cytologic studies cited, the analysis embarked with the basic assumption that behavior characteristic of the newborn infant is controlled at a nuclear or subcortical level. Further analysis concerned those qualities of overt behavior which reflected (a) an inhibitory influence from the cortex upon the functioning of infracortical centers, (b) the onset of cortical participation in activating or conducting a particular aspect of the behavior pattern,

and (c) the expansion and integration of various cortically controlled movements which are essential to an integrated bipedal gait.

"Similarly analyses were made of the changing configurations in neuromuscular movements which lead to the assumption of an erect posture. Criteria were proposed for the differentiation of seven significant phases." AUTHOR'S SUMMARY.

ACUTE FEBRILE POLYARTICULAR RHEUMATISM WITH PULMONARY, ABDOMINAL AND CARDIAC LESIONS. G. B. CAVAZZUTTI and G. RODRIGUEZ, Rev. Soc. de pediat. de La Plata **1**:84 (Nov.-Dec.) 1940.

A 7 year old girl of a tuberculous mother had fever, polyarthritis, abdominal distention, bladder retention and vomiting. A few days after admission there was consolidation at the base of the left lung. There were electrocardiographic changes consistent with extrasystoles and an increased QRS interval. The patient was treated and relieved by salicylate therapy. HIGGINS, Boston.

THE METHOD OF HIRAM WINNETT ORR IN TREATING OSTEOMYELITIS. C. F. BOFFI, Rev. Soc. de pediat. de La Plata **1**:112 (Nov.-Dec.) 1940.

Orr, an American surgeon from Nebraska, presented a method for treating osteomyelitis during the World War. This method consists of cleaning the affected area of sequestrum and diseased tissue, packing the opening with petrolatum gauze and covering the wound with a plaster cast.

This method of treatment failed to give a good result in only 5 per cent of Boffi's 62 cases. In 48 per cent the tibia was involved, in 30 per cent the femur, in 10 per cent the humerus and in 4 per cent the radius or ulna.

HIGGINS, Boston.

BESNIER-BOECK DISEASE. S. VAN CREVELD, Nederl. tijdschr. v. geneesk. **84**:4028 (Oct. 19) 1940.

A girl suffering from Besnier-Boeck disease showed among other clinical evidences symptoms of disturbed renal function, with the formation of stones in the urinary tract, recurring swelling of the salivary glands and roentgenographic abnormalities of the lungs. Attention is drawn to a new inconstant phenomenon, hypercalcemia. A possible relation is discussed between the changes found in the metabolism of different patients and some clinical symptoms of the disease on the one hand and a possibly disturbed function of the parathyroid glands on the other hand. AUTHOR'S ABSTRACT.

OSTEOMYELITIS OF THE SKULL CAP, ISSUING FROM AN INFLAMED FRONTAL SINUS. A. A. J. VAN EGMOND, Nederl. tijdschr. v. geneesk. **84**:4595 (Nov. 23) 1940.

Two patients suffering from this disease are described. One patient, a boy 13 years old, recovered after extensive surgical treatment.

VAN CREVELD, Amsterdam, Netherlands.

DERMATOMYOSITIS IN CHILDHOOD. MANES S. HECHT, J. Pediat. **17**:791 (Dec.) 1940.

"Five cases of dermatomyositis encountered at the Harriet Lane Home have been described. There were two deaths and three recoveries.

"Four cases were complicated by calcinosis universalis.

"Two patients had intercurrent attacks of erysipelas; another had streptococcic cellulitis. They recovered from these complications. Suppurative myositis was the cause of one death.

"Muscle involvement was widespread and severe in each instance. Skin manifestations varied. Gingivitis occurred in three cases.

"Hematologic findings were essentially normal, except for eosinophilia of varying degree in three cases and severe anemia in one.

"There is no specific treatment for dermatomyositis. . . . The death rate is high, but patients who are fortunate enough to survive overcome contractures and muscular weakness practically completely. Calcium deposits, in cases so involved, disappear in time by absorption, sloughing out, or both.

"The danger of intercurrent pyogenic infection in this disease cannot be stressed too greatly. Apparently, minor trauma may be the opening wedge for serious or even fatal infection.

"The relationship of dermatomyositis to generalized scleroderma has been discussed. . . . There is no adequate proof that dermatomyositis is of infectious origin.

AUTHOR'S SUMMARY.

ACNE JUVENILIS AND CARBOHYDRATE METABOLISM. MILIO FERNANDEZ BLANCO, ENRIQUE E. FONGE and BOTBOL, Rev. méd. latino-am. **26**:36 (Oct.) 1940.

Sugar tolerance tests in 21 cases revealed (*a*) normal fasting blood sugar content and (*b*) only 1 case in which there was any prolonged postprandial elevation. From a clinical viewpoint it appears that a low carbohydrate diet causes improvement in some cases, but there is no certain evidence that hyperglycemia is an etiologic factor in acne. The authors frequently found abnormally low blood sugar curves. Preliminary investigations on the inorganic phosphorus content of the blood before breakfast demonstrated an elevation in 6 of the 7 cases investigated.

DWYER, Kansas City, Mo.

MULTIPLE CUTANEOUS ABSCESSES IN A NURSING INFANT. E. G. CASELLI and J. F. MORANO BRANDI, Rev. Soc. de pediat. de La Plata **1**:126 (Nov.-Dec.) 1940.

A 4 month old infant entered the hospital in a state of extreme dehydration and severe toxicity and presenting multiple abscesses on the body and extremities. Staphylococcus was the organism cultured. Treatment included immunotransfusions.

HIGGINS, Boston.

DIAPERS TREATED WITH BORIC ACID IN THE THERAPY OF ECZEMA NATUM IN BABIES. I. VAN DER HEYDEN, Nederl. tijdschr. v. geneesk. **84**:4162 (Oct. 26) 1940.

The author strongly recommends the continual use of dry diapers soaked in solution of boric acid and dried again for babies with eczema natum. This treatment results in disappearance of the eczema within two weeks. The treatment must be continued till the appearance of the skin has become normal.

VAN CREVELD, Amsterdam, Netherlands.

A SIMPLE EXAMINATION TO DETECT ALLERGY. H. A. E. VAN DISHOECK, Nederl. tijdschr. v. geneesk. **84**:4260 (Nov. 2) 1940.

A simplification of examination for allergy to a practical routine is described. The author recommends use of: (1) the cutaneous method, (2) dry allergens (pure proteins kept in a dry state, not liable to deterioration, with only specific action and cheap), (3) a rational selection of allergens (according to their importance as sensitizing agents 70 allergens were made representing normal surroundings and foods), (4) antigen groups (the antigens were grouped into seventeen combinations, the preliminary testing thus being limited to seventeen scratches on

the skin) and (5) differentiation (a choice of the most important allergens [twenty-six] for differentiation when reactions to one of the groups are positive).

In inveterate cases tests for allergy have only a relative value; in other cases, however, the patient can be freed from all his symptoms by merely eliminating the allergen, just as is naturally the case with hay fever in winter.

VAN CREVELD, Amsterdam, Netherlands.

PATHOGENESIS OF ACRODYNIA AND TREATMENT WITH NICOTINIC ACID. A. J. R. E. VAN SCHOONHOVEN VAN BEURDEN, Nederl. tijdschr. v. geneesk. **84**:4793 (Dec. 7) 1940.

A review is given of the oral treatment with nicotinic acid of 3 patients with acrodynia, 1 aged 16 months and 2 aged 4 years. The symptoms disappeared quickly, and complete recovery took place within two months (whereas the mean duration before 1938 was about six months). The pathogenesis of this condition is dealt with, and it is suggested that its cause lies in a relative shortage of nicotinic acid. The possibility of a combined avitaminosis B_1 and nicotinic acid is referred to. In a fourth case very satisfactory results were obtained after intramuscular injection of 100 mg. of nicotinic acid amide during ten days.

VAN CREVELD, Amsterdam, Netherlands.

Surgery and Orthopedics

EARLY SIGNS OF ORTHOPEDIC CONDITIONS. JOHN JOSEPH NUTT, Ann. Int. Med. **14**:1050 (Dec.) 1940.

The author, feeling that too many physicians pay little or no attention to the body mechanism, has presented a paper in which he brings out the more important parts of an orthopedic examination. The paper is intended not for the orthopedic surgeon but for the general practitioner. He stresses the "normal" mechanics so far as the skeletal system is concerned and tends to correlate the normal from early observations in various abnormal conditions. GARD, Galveston, Texas.

TREATMENT OF SHORTENING OF ONE OF THE LOWER EXTREMITIES. C. P. VAN NES, Nederl. tijdschr. v. geneesk. **84**:3854 (Oct. 5) 1940.

The trouble caused by considerable shortening of one leg may be cured by lengthening the shortened extremity or by shortening the longer extremity. The author prefers shortening the longer leg, especially in cases in which the difference in length of the legs is more than 5 cm. He has treated 84 patients in this way; the greatest difference in length, which disappeared after the successful operation on the longer leg, was 12.5 cm. The results are favorable on the whole.

VAN CREVELD, Amsterdam, Netherlands.

Teeth and Dentistry

ENDEMIC FLUOROSIS IN SOUTH INDIA: A STUDY OF THE FACTORS INVOLVED IN THE PRODUCTION OF MOTTLED ENAMEL IN CHILDREN AND SEVERE BONE MANIFESTATIONS IN ADULTS. C. G. PANDIT, T. N. S. R. RAO, D. S. R. RAO and V. KRISHNAMURTI, Indian J. M. Research **28**:533 (Oct.) 1940.

Mottled enamel occurred in children wherever the fluoride content of the water was greater than 1 part in a million, and the incidence of mottled enamel was in proportion to this fluoride content. Deciduous teeth were also affected. Severe forms affecting bones, ligaments and joints were found in three northern sections, and the content in these areas was 6 parts per million in the water supply. It

took fifteen years of continuous residence in one area for adults to show signs of intoxication. The incidence had a relation to the economic and nutritional status of the community. Vitamin C deficiency increased the severity.

SNELLING, Toronto, Canada.

A CASE OF HEREDITARY BROWN HYPOPLASIA OF DENTAL ENAMEL. M. DECHAUME, Bull. Soc. pédiat. de Paris **37**:110 (March) 1939.

A boy 13½ years old was presented who had hypoplastic brownish-pigmented teeth. This anomaly was believed to be due to hypoplasia of the enamel, as the defect was seen in roentgenograms of the teeth which had not yet erupted. The causation and the significance of the condition as well as the future behavior of such teeth remain obscure.

BENJAMIN, Montreal, Canada.

Miscellaneous

EPHEDRINE CAMPHOSULFONATE. C. J. TEOBALDO, R. NICO and A. A. DATO, Rev. Soc. de pediat. de La Plata **1**:130 (Nov.-Dec.) 1940.

The preparation of ephedrine camphosulfonate from camphor and ephedrine is described. Tested on dogs it produced a moderate and prolonged rise in blood pressure.

HIGGINS, Boston.

THE HEREDITY OF FINGER PRINTS. J. DANKMEYER, Nederl. tijdschr. v. geneesk. **84**:4785 (Dec. 7) 1940.

The author gives a review of the genetic principles which, according to present scientific conceptions, can be distinguished in finger prints. The methods of examination of the papillary patterns are described. Special attention is drawn to the fact that finger prints may be used in order to determine descent.

VAN CREVELD, Amsterdam, Netherlands.

MERCURY BICHLORIDE TITRATION IN THE SERUM: A SIMPLE TEST WHICH CAN REPLACE THAT OF TAKATA. J. B. STOLTE, Nederl. tijdschr. v. geneesk. **84**:4887 (Dec. 14) 1940.

A simple test is described, the results of which may be compared with those of titration with Hayem's solution after Gros (1939, 1940) and with the Takata reaction. It is based on protein flocculation in the serum caused by mercury bichloride in saline solution. The test is performed with 0.5 cc. of serum, diluted with 1 cc. of 0.9 per cent solution of sodium chloride and titrated with 0.1 per cent mercury bichloride. It is quantitative to some extent and more sensitive than the Takata reaction. Conditions attended with hepatic damage often give a lowered titer. Because of its simplicity the test is suitable for routine use in general practice.

VAN CREVELD, Amsterdam, Netherlands.

Society Transactions

CHICAGO PEDIATRIC SOCIETY

JAMES H. WALLACE, M.D., *President, in the Chair*

Regular Meeting, Feb. 17, 1942

Ratio of Cardiovascular Malformations to Other Types of Heart Disease in Children. DR. JAMES H. WALLACE.

This article appears in full, with discussion, in this issue of the ARCHIVES, page 1096.

Evaluation of Rheumatic Nodules in Children: A Clinical Study of 167 Cases. DR. ROWINE M. HAYES and DR. STANLEY GIBSON.

This article will be published in full in *The Journal of the American Medical Association.*

JAMES H. WALLACE, M.D., *President, in the Chair*

Regular Meeting, March 17, 1942

Pediatric Foot Problems. DR. H. A. SOFIELD.

Pediatric problems involving the foot include two main groups of conditions: (1) congenital abnormalities and (2) acquired abnormalities. For the purposes of this discussion these two main groups may be subdivided into two classes: (1) conditions which may well be treated by the pediatrician and (2) conditions which, because of their complexities, should be better treated by the orthopedic surgeon.

The common congenital abnormalities of the foot are: (1) weakness; (2) flatfoot; (3) pigeon toe; (4) clubfoot; (5) supernumerary bones and (6) congenital absence of bones. The pediatrician may well handle the ordinary flat foot, the ordinary pronated foot, the slightly pigeon-toed foot and the foot with congenital absence of bones if the deformity is not too severe. The orthopedic surgeon should treat all the severe abnormalities in the congenital group and, in my opinion, clubfoot and supernumerary bones.

In the group of acquired abnormalities may be listed: (1) deformities following disease, such as infantile paralysis, osteomyelitis or encephalitis; (2) acquired flatfoot following prolonged recumbency in bed or caused by excess weight or maladapted footwear; (3) traumatic deformities, following injury, and (4) deformities associated with disturbances of development of bones or other structures, exclusive of known infective processes. In this group the pediatrician is treading on safe ground in properly treating the ordinary acquired flatfoot, the mild traumatic deformities and the mild deformities due to disturbances in developmental progression. The orthopedic surgeon should assume the responsibility for the treatment of all the severe deformities, in particular of the deformities associated with disease.

DISCUSSION

DR. M. I. VINNECOUR: Occasionally one sees a foot that looks as if it were pigeon toed but the deformity seems to start at the [illegible] and the whole foot is deformed. I wonder if that could be adjusted by simple measures or whether it is an orthopedic problem.

DR. E. T. MCENERY: With reference to overlapping toes: In small babies one will often find the third toe rising above the second, and the fourth above the fifth. On inquiry, one learns that this "runs in the family." What should be

done about such an abnormality? Should it be left alone; should the foot be put in a cast, or should the child be turned over to the orthopedist?

DR. JESSE R. GERSTLEY: May I ask Dr. Sofield if he advises any precautions during scarlet fever, and also whether the pediatrician should adopt any particular procedure when he lets the patient convalescent from scarlet fever get out of bed?

DR. T. P. SALTIEL: Dr. Sofield mentioned permitting children to go barefoot. Does not a cement or a hard floor have an effect on the arch of the foot if an infants walks on his bare feet?

DR. JOSEPH K. CALVIN: Are there any exercises advised for weak feet? Also, at what age should a child be allowed to wear oxfords?

DR. HAROLD A. SOFIELD: In cases of pigeon toe, in which the turning in seems to begin at the hip, I think there is more than ordinary pigeon toe deformity. I should be cautious about treatment and about prognosis. One occasionally encounters metatarsus varus which may look like pigeon toe. This is an extremely resistant condition and may result in severe deformity. If the whole leg seems to turn in at the hip, I think one should have a roentgen examination made and secure consultation on the case.

Overlapping toes are rather difficult to correct by conservative means. They may be strapped or splinted, but when the splint is removed they return to the original position. Metatarsophalangeal fusion works pretty well. Of course, the radical treatment is amputation of the offending member. I do not believe splinting does much good.

So far as scarlet fever is concerned, I do not see patients with that disease. But the pediatricians with whom I am associated have come to recognize that subsequent to scarlet fever the feet seem to be weak. I think it would be well to use orthopedic heels or to wedge the heels for a few weeks, particularly if the patient is obese. Usually the support can be removed within a few weeks.

I do not think it makes much difference whether a baby is running on hard floors, on carpets or on the ground. I know it is said that children should not be allowed to go without support for the delicate structures, but I take the opposite view. So far as wearing oxfords is concerned, the two children shown here as having normal feet are aged 3 and 7 years and have never worn high shoes. They were started with moccasins and went from moccasins to oxfords and sandals in the summer. I do not believe it necessary ever to use a full shoe on normal feet. Without the upper part of the shoe, the foot gets more exercise. These children happen to be my own. They ran on hard floors barefooted and never wore anything but oxfords and moccasins, and I think they are better than if they had been protected.

I have not been very successful with exercises for small children. Older children may do exercises for a few weeks, and adults for a few months, and then they quit. I think exercises would be beneficial if one could see that they were continued.

Treatment of Torticollis in the Newborn. DR. FREMONT A. CHANDLER.

Torticollis should be classified according to etiologic factors, which may number between fifty and one hundred. In any discussion of this subject such a classification must be considered. The most common type, muscular torticollis, which is seen in newborn infants, has been erroneously attributed to a hematoma formation in the sternocleidomastoid muscle. Hemorrhage as an etiologic factor during the first few weeks of life has not been verified. In a series of 12 cases, in which the patients ranged in age from 4½ weeks to 3 months, pathologic studies of the tumor presenting have been made. In each of these, the tumor has been found to consist of a hard fibrous mass with no evidence of hemorrhage. In all probability this fibroma represents the excessive repair found in young infants. Early correction of the deformity has prevented the secondary changes of the skull, face and spine.

DISCUSSION

DR. PHILIP L. ARIES: I should like to ask Dr. Chandler how long he would advise waiting for possible spontaneous regression of this condition to take place before recommending surgical treatment.

DR. M. I. VINNECOUR: What causes the asymmetry of the face? It is known to develop, but what is the mechanism?

DR. JULIUS HESS: What histologic changes in the muscle are to be expected at the site occupied by the tumor?

DR. KING WOODWARD: Do massage and stretching of the muscles on the affected side influence the tumor mass?

DR. FREMONT CHANDLER: I think the length of time to wait depends on the size of the tumor and the relative rate at which the deformity of the head is developing. My feeling is that early surgical intervention prevents a lot of trouble.

About the asymmetry of the face, it has been thought that there is interference with blood supply on the involved side and that the asymmetry of the face and the position of the head are due to lack of proper functioning. It is known that they sometimes return after correction.

I think stretching probably stimulates the formation of scar tissue. I know it is said that if one stretches the neck the child will outgrow the condition. I think there is the usual course whether massage is given or not.

As to the histologic picture postoperatively, I have not operated on any patient the second time. I am careful to see that the operation is done without loss of blood, because of the proximity of some of the large vessels.

The Kenny Treatment for Infantile Paralysis. DR. EDWARD L. COMPERE.

The theory espoused by Miss Elizabeth Kenny hypothesizes early *spasm* of the affected muscles, rather than flaccidity. Later inability to use voluntarily a muscle not actually paralyzed may be the result of *mental* alienation. A third consideration which she emphasizes is muscular incoordination, which may involve a group of muscles or may be present in a segment of a single muscle.

The principles of treatment advocated by Miss Kenny include rest, application of hot moist packs and muscle training, without massage, hydrotherapy or use of splints.

Immediately after the diagnosis of acute anterior poliomyelitis has been made, the patient is kept in hot packs for twelve hours each day. The packs are made from strips of woolen blankets and are changed every two hours. These must be carefully measured, so that they can be used to wrap around an extremity between and not including the joints. A separate piece of blanket is used for the short muscles of the foot. Another strip is used for the muscles between the ankle and the knee; a third, between the knee and the hip, etc. Sometimes a patient is swathed in steaming, moist, but never wet, blanket strips from the chin to the toes, the joints being left free as much as possible.

No splints of any kind are permitted. The patient is placed on a board-supported mattress. When the spasm in the gastrocnemius muscle has been relaxed, the feet are kept firmly against an upright board placed across the foot of the bed. This is not done for the purpose of splinting or to prevent foot drop, according to Miss Kenny. Its purpose is to create a sensation of weight bearing which will produce the standing reflex and stimulate the patient to the use of muscles required for standing.

Muscle training, which is excellently carried out by Miss Kenny and her associates, is begun relatively early but not until most of the spasm has disappeared. Exercises are given on a treatment table. Neither massage nor hydrotherapy is permitted.

The patient is taught the sites of origin and insertion of the different muscle groups. He is shown what to expect when a particular muscle, contracting between its site of origin and its insertion, is functioning properly.

Contrary to the impression that may be gained from reading some of the articles published in lay magazines, Miss Kenny does not claim to cure all patients. Some are left paralyzed; some will subsequently require a surgical operation; perhaps some will never walk without braces. Miss Kenny does state that when a patient who has received her treatment has an operation he will be in better condition for that operation than he would have been if the orthodox treatment had been used.

Conclusion.—The Kenny theory explaining the causation of paralysis from anterior poliomyelitis cannot be accepted entirely by any one who has a background of physiologic and pathologic training and experience. On the other hand, the treatment advocated by Miss Kenny is a definite improvement over the orthodox methods for prevention of crippling. This program of treatment will relieve muscle spasm and will keep the patient comfortable. It will prevent deformity. During the two years that Miss Kenny has been in Minneapolis scoliosis has never developed in one of her patients. The tissue tone and turgor are definitely better than in patients treated by more orthodox methods. Cold, blue, atrophic extremities are not seen in patients given her treatment.

DISCUSSION

DR. ARCHIBALD L. HOYNE: As I have said on several occasions, my associates and I at Cook County Hospital carried out for a period of about fifteen years a regimen that approached the Kenny method, with the exception of the use of warm packs. Our plan did not change until some of the orthopedic surgeons started to send us splints and the interns and residents began to show how our patients should be treated. I do not think the results are better now than they were twenty-five years ago, when we did not apply splints early. In 1916-1917 we used heavy woolen stockings and also kept the affected parts warm with blankets, which is somewhat in line with the Kenny method. The improvement, as Dr. Compere said, is often remarkable. Some patients come to the hospital with rather extensive paralysis and this clears up completely; others, who have paralysis of only a small group of muscles, may make little improvement.

I should like to hear from Dr. Compere the result of the Kenny method on patients who have paralysis of the intercostal muscles and the diaphragm. We are disappointed too often in the efforts put forth in behalf of such patients. The respirator usually prolongs life and occasionally saves it. I wonder if Miss Kenny cures patients with respiratory paralysis in two or three days.

DR. M. I. VINNECOUR: Dr. Compere emphasized the use of moist heat. Has any one tried electric light, such as is used for burns? Also, what rationale does Miss Kenny offer for using wet, moist or dry heat?

DR. E. ROBBINS KIMBALL: I had the opportunity of treating about 200 patients under the direction of Dr. John A. Toomey at the Cleveland City Hospital. We used light treatment, hot packs, hot baths and many procedures brought out in the Kenny treatment, which Dr. Toomey has been using for about eighteen years.

I agree with Dr. Compere that the condition of the paralyzed muscles seemed better than when they were treated by the older method of immobilization. We started treatment immediately if we were sure the patients were not going to die.

DR. HAROLD A. SOFIELD: I should like to make one comment about the circulatory embarrassment. It may be a little early to judge the result of the Kenny treatment in the United States as to circulatory embarrassment. In my experience the clammy, cold, blue extremities are seldom seen at the end of one year. I should rather withhold my opinion as to circulatory trouble until more than a year has elapsed. I think that the circulatory embarrassment usually develops after a period of years rather than within one year.

DR. EDWARD L. COMPERE: Miss Kenny believes that what pediatricians may diagnose as diaphragmatic paralysis or paralysis of the intercostal nerves is merely muscle spasm; that some patients with infantile paralysis have difficulty in swallowing chiefly because of spasm. She has taken some patients out of the respirator, impressed them with her dominant personality, applied hot packs and

"taught them to breathe," and they have been able to stay out and breathe with ease. On the other hand, I have been informed by physicians working with her that there have been 3 deaths in Minneapolis of patients who were kept out of the respirator on the advice of Miss Kenny.

The danger lies in the fact that Miss Kenny cannot tell when the diaphragm is actually paralyzed or when it is merely in spasm. If the difficulty in breathing results from spasm of the intercostal muscles, the hot pack treatment may relax them and permit the patient to breathe more freely. However, in my opinion, it is a serious mistake to take a patient out of the respirator and leave him out until one has determined by fluoroscopic examination that the diaphragm is not paralyzed.

I agree with Dr. Sofield that some of the patients who have such marvelous soft tissue tone and nutrition may later have deficiencies of circulation in the paralyzed extremities.

I know that Dr. Hoyne has for many years emphasized the importance of warmth for the paralyzed extremities. I do not know which kind of heat will relax and soothe the muscles best. Personally, I favor moist heat. I do not think that any one has made comparative studies in cases of poliomyelitis. Miss Kenny does place hot packs on the back of the neck for patients with bulbar involvement. I have used short wave diathermy for 2 patients with bulbar involvement. Both these patients recovered, although I cannot say that the improvement was the result of the treatment.

Book Reviews

Die Störungen der Blutgerinnung beim Kinde mit besonderer Berücksichtigung der K-Vitamins und der Neugeborenenpathologie. By Professor Dr. G. Franconi, Direktor der Universitätskinderklinik, Zürich. Price, RM 7.20. Pp. 160, with 21 illustrations. Leipzig: George Thieme, 1941.

This small book, of 160 pages, is a scholarly presentation of a subject of far reaching practical importance. The author's particular interest in vitamin K was inspired by the observation of hemorrhagic disturbances in certain cases of celiac disease several years ago. These disturbances, he concluded, were due to hypothrombinemia, which he could not then explain. With the discovery that vitamin K, a fat-soluble vitamin produced in the intestinal canal by bacterial action, is necessary for the synthesis of prothrombin in the liver, the answer was clear. The child with severe celiac disease was unable, on account of defective fat digestion, to utilize the fat-soluble vitamin K; there resulted inadequate prothrombin synthesis and consequently a hemorrhagic tendency. The more recent elaboration of accurate and simple methods of estimating the prothrombin content of the blood plasma, together with the isolation of vitamin K and later its synthetic production, have made possible the study and clearer understanding of many disturbances of blood coagulation.

While the author discusses many hemorrhagic disturbances and gives clinical case histories to illustrate each, the chief object of the book is to evaluate hypoprothrombinemia in its relationship to hemorrhagic disease of the newborn child and the role of vitamin K in the correction of this disturbance.

A wise and timely introductory statement is worth quoting: "Every time a new fact is discovered there is the danger of overestimating its significance; we shall see for example that with avitaminosis K the hemorrhagic catastrophies of the newborn infant have not been completely explained, as many in their first enthusiasm assumed. Vitamin K is only one of many factors responsible for normal blood coagulation and cannot be assumed to be at fault in every hemorrhagic disturbance. In concrete cases it is not always possible to explain adequately the causes of the hemorrhagic tendency; in fact, I believe that in most of the severe hemorrhagic castastrophies several causes are combined."

K avitaminosis may occur under the following circumstances:

1. When there is no vitamin K in the bowel. This is the case in the newborn child, with its still sterile bowel content and its insignificant food intake.

2. When vitamin K actually is present in the bowel but cannot be absorbed. This occurs in obstructive icterus, in sprue of adults and celiac disease of children, i. e., in conditions in which absorption of fat, including that of the fat-soluble vitamin K, is seriously impaired.

3. When the particular liver function which has to do with prothrombin production has been damaged by disease of the liver or has been temporarily inhibited by disturbances of transition to extrauterine life. The author thoroughly discusses the reasons for the occurrence of hypoprothrombinemia in the newborn infant. When, however, the question arises why, since hypoprothrombinemia is present in all newborn infants, they do not all have hemorrhages, he sidesteps by saying that it depends on the degree, and then admits that infants with a greatly prolonged prothrombin time do not always bleed and that the hypoprothrombinemia need not be the only cause of bleeding. He differentiates a levis and a gravis form of hypoprothrombinemia on the basis of the degree of increase in the prothrombin time. The levis, or physiologic, form occurs in those with a prothrombin

time up to ninety seconds, while those with a prothrombin time over ninety seconds are classified as exhibiting the gravis form. Even the gravis form may, he admits, run a subclinical course.

The author exhibits a remarkable self restraint in forcefully pulling himself out of flights of enthusiasm over the role of hypoprothrombinemia in hemorrhagic disease of the newborn and the value of vitamin K in its treatment by periodically retreating to his original introductory statement concerning the many factors involved.

Every type of bleeding seen in the newborn infant is illustrated by precise case histories, including laboratory findings and autopsy reports with a careful summary and discussion of each one. All of this is interesting and instructive. An excellent review of such subjects as intracranial hemorrhage, icterus gravis and their relationship to hemorrhagic disease deserves special mention.

The book is important in that it deals with a timely subject in a thorough and scholarly manner. There is a good deal of purely speculative thinking but also careful analysis of scientific facts. In a short summary he characterizes his whole thesis: "As long as the facts underlying our scientific knowledge of the newborn period continue to be so few, we might better content ourselves with a speculative reconstruction of particular disease pictures which would seek to bring many or even all the facts into etiologic relationship. Instead of speaking of birth trauma, allergic syndrome, immaturity, newborn erythroblastosis, etc., we should be satisfied with the concept of disturbances of adaptation or accommodation to extrauterine life. Disturbances of transition might affect many important separate functions, especially of the liver; in some instances, only one function; in others, several. In one, a disturbance will scarcely produce any symptoms (levis, or physiologic, form), while in others, it may reach a threatening or even fatal degree (gravis form). A familial disposition to such disturbances of transition doubtless does occur; it is, however, much less likely to be on a hereditary basis than dependent on some maternal health factor, such as a toxemia of pregnancy."

Physical Measurement of Young Children: A Study of Anthropometric Reliabilities for Children Three to Six Years of Age. By Virginia Bergstresser Knott, Ph.D. University of Iowa: Studies in Child Welfare. Price, paper, $1.00; cloth, $1.35. Pp. 99, with 15 illustrations and 9 tables. Iowa City: University of Iowa Press, 1941.

After a review of literature regarding the accuracy of anthropometric observations, the author reports on 35 physical measurements studied on 131 different preschool children. The measurements include various dimensions of body length, transverse and anterior-posterior diameters of trunk and head, girth measurements, and also some measures of skin and subcutaneous tissue. The basic data consist of 3,643 pairs of measurements taken by two different observers and 221 pairs of measurements taken by the same observer. Reliability values were computed from the differences obtained between the various pairs of observations. The results of reliability are presented in terms of absolute difference (median, ninetieth percentile and maximum difference), and in a special chapter (VIII) also in relation to size of dimension (median and maximum difference in per cent of the mean size of the respective dimension). In terms of absolute differences, median values range from 0.5 to 6 mm.; when related to size, median differences range from 0.24 per cent (stature) to over 10 per cent (thickness of skin above iliac crest). Thus, in order of rank, stature, sitting height, head girth, head breadth, hip width and leg girth offer the most reliable measurements, whereas skin and subcutaneous tissue are shown to be the least reliable when the median differences are related to the magnitude of these measures.

The careful study reveals a great deal of valuable detailed information and should be read by all students of physical growth who desire a criterion in their anthropometric technic.

Psychiatry in Medical Education. By Franklin G. Ebaugh, M.D., and Charles A. Rymer, M.D. Price, $3.50. Pp. 619, with no illustrations. New York: The Commonwealth Fund, 1942.

The authors present a detailed history of the development of the teaching of psychiatry in the medical schools, with a consideration of its present status and the prospect for improvement. There is still confusion in this branch of the medical curriculum, in some cases due to the adding of courses to meet standards rather than to the recognition of a need for these courses, and in other cases due to conflicting terminology, failure to integrate this subject with others, lack of common agreement as to principles and methods of teaching and different points of view emanating from various schools of psychiatry.

The authors have followed the development of this branch of teaching in the various medical schools and have recorded its progress in each school. They set up general principles for teaching and suggest methods for improvement.

The importance of children's clinics is stressed and the need for the teaching of child psychiatry is mentioned. The book concerns itself, however, mostly with adult psychiatry and the teaching of psychobiology. Mental growth and development receive little consideration, and the other schools of psychiatry (psychoanalysis, for example) are largely omitted. The book is well written and gives a valuable history and picture of this new and important addition to the curriculum of medical schools.

The Clinical Application of the Rohrschach Test. By Ruth Bochner, M.A., and Florence Halpern, M.A. Price, $3.00. Pp. 220, with no illustrations. New York: Grune & Stratton, Inc., 1942.

The Rohrschach test is used to measure the nonintellectual traits of a personality. It is considered by many as a valuable method for obtaining an objective, nonpersonal index of the emotional reactions of persons. It consists of showing the subject to be tested ten standardized ink blots and asking him to state what they might be. Since they are without content, the subject must project himself into them. There is a definite technic for summarizing the responses and comparing them with those of other persons.

In this volume the authors describe the test, the method of giving it and the details for evaluating and tabulating the results. The responses of normal, neurotic and psychotic persons differ widely. These responses are described as a diagnostic test of different types of personality. In addition, there are a description of the responses of feebleminded persons and a description of children's records. While the tests have been given to many children, no definite criteria for classifying them have been developed.

This is the most detailed and valuable discussion of the Rohrschach test that has been written. The style is clear, and the book is written in an unusually interesting manner.

Roentgen Treatment of Infections. By James F. Kelly, M.D., Professor and Director of the Department of Radiology, Creighton University School of Medicine, and D. Arnold Dowell, M.D., Assistant Professor of Radiology, Creighton University School of Medicine. Price, $6.00. Pp. 422 and index, with 122 illustrations. Chicago: Yearbook Publishers, Inc., 1942.

In this volume the authors have made a rather partisan contribution to the extremely controversial subject of the roentgen treatment of infections. To the reviewer the most interesting sections are those dealing with parotitis and erysipelas. It is hoped that this book will serve as a stimulus to further and perhaps better controlled studies of the limited role of the roentgen rays in the treatment of infection.

Directory of Pediatric Societies*

INTERNATIONAL

International Association of Preventive Pediatrics

President: Prof. S. Monrad, Dronning Louises Børnehospital, Copenhagen, Denmark.
Secretary: Dr. Daniel Oltramare, 15 Rue Lévrier, Geneva, Switzerland.

International Congress of Pediatrics

President: Dr. Henry F. Helmholz, Mayo Clinic, Rochester, Minn.
General Secretary: Dr. Kenneth D. Blackfan, 300 Longwood Ave., Boston.
Assistant Secretary-Treasurer: Dr. Charles F. McKhann, University of Michigan, Ann Arbor, Mich.

Canadian Committee:

Chairman: Dr. Alan Brown, Hospital for Sick Children, 67 College St., Toronto.
Secretary: Dr. H. P. Wright, 1509 Sherbrooke St. W., Montreal.
Place: Boston. Time: Postponed indefinitely.

International Congress for the Protection of Infancy

Secretary: Prof. G. B. Allaria, Corso Bramante 29, Torino 120, Italy.

FOREIGN

Argentine Pediatric Society of Buenos Aires

President: Dr. Martin Ramón Arana, 1809 Rodriguez Peña, Buenos Aires.
General Secretary: Dr. Alfredo Larguia, Cerrito 1179, Buenos Aires.

British Pediatric Association

President: Prof. Charles McNeil, 44 Heriot Row, Edinburgh, Scotland.
Secretary: Dr. Arthur G. Maitland Jones, 31A Weymouth St., London, W. 1.

Danish Pediatric Society

President: Dr. E. Lenstrup, Copenhagen.
Secretary: Dr. E. Gjørup, Dronning Louises Børnehospital, Copenhagen.

Nederlandische Vereeniging voor Kindergeneeskunde

President: Dr. J. H. G. Carstens, Servaasbolwerk 14ª, Utrecht, Holland.
Secretary: Dr. R. P. van de Kasteele, Laan van Poot 340, 's Gravenhage, Holland.
Place: Different places. Time: Three times a year.

Paediatrický Spolok na Slovensku

President: Dr. A. J. C. Chura, Lazaretská 11, Bratislava.
Secretary: Dr. P. Rados, Lazaretská 6, Bratislava.
Place: Pediatric Clinic, University Bratislava. Time: Six times a year.

Royal Society of Medicine, Section for the Study of Disease in Children

President: Dr. E. A. Cockayne, 98 Harley St., London, W. 1, England.
Secretary: Dr. R. Lightwood, 86 Brook St., London, W. 1, England.
Place: 1 Wimpole St., London. Time: Fourth Friday of each month, 4:15 p. m.

* Secretaries of societies are requested to furnish the information necessary to make this list complete and to keep it up to date.

PALESTINE JEWISH MEDICAL ASSOCIATION, SECTION OF PHYSICIANS OF CHILDREN'S DISEASES

President: Prof. S. Rosenbaum, 26 Bialikstr., Tel Aviv.
Secretary: Dr. A. Brünn, 9 Maazestre, Tel Aviv.

SOCIEDAD CUBANA DE PEDIATRÍA

President: Dr. Clemente Inclan Costa, Marique 48, Habana.
Secretary: Dr. Serafin Falcon Lopez, Calle B No. 356, Velado, Habana.
Place: Cátedra de Clinica Infantil, Hospital Mercedes, Habana. Time: Last Wednesday of every month.

SOCIEDAD MEXICANA DE PEDIATRIA

President: Dr. Fernando López Clares, 12/a. Medellín 191, Mexico City.
Secretary: Dr. Jesus Gómez Pagola, Versalles 64, Mexico City.

SOCIEDAD VENEZOLANA DE PUERICULTURA Y PEDIATRIA

President: Dr. Ernesto Vizcarrondo, Venezuela.
Secretary: Dr. E. Santos Mendoza, Venezuela.

SOCIÉTÉ DE PÉDIATRIE DE PARIS

President: Dr. B. Weill-Hallé, 49 Avenue Raymond Poincare, Paris, France.
Secretary: Dr. Jean Hallé, 10 bis Rue Pré aux Clercs, Paris, France.
Place: Hôpital des Enfants Malades, 49 Rue de Sèvres. Time: 4:30 p. m., third Thursday of every month.

URUGUAYAN SOCIETY OF PEDIATRICS

President: Dr. Conrado Pelfort, Av. 18 de Julio 1246, Montevideo.
Secretary: Dr. Héctor Mourigan, Ave. 18 de Julio 2175, Montevideo.

NATIONAL

AMERICAN MEDICAL ASSOCIATION, SCIENTIFIC ASSEMBLY, SECTION ON PEDIATRICS

Chairman: Dr. Philip M. Stimson, 25 Claremont Ave., New York.
Secretary: Dr. Hugh L. Dwyer, 315 Alameda Rd., Kansas City, Mo.
Place: Atlantic City. Time: June 8-12, 1942.

AMERICAN ACADEMY OF PEDIATRICS

President: Dr. Edward C. Mitchell, 1073 Madison Ave., Memphis, Tenn.
Secretary: Dr. Clifford G. Grulee, 636 Church St., Evanston, Ill.
Place: Palmer House, Chicago. Time: Nov. 4-7, 1942.
Region I. Place: Bellevue-Stratford Hotel, Philadelphia. Time: April 1-3, 1942.
Region III. Place: Hotel Cleveland, Cleveland. Time: May 14-16, 1942.
Region IV. Meeting cancelled.

AMERICAN HOSPITAL ASSOCIATION, CHILDREN'S HOSPITAL SECTION

Chairman: Dr. D. L. Richardson, 593 Eddy St., Providence, R. I.
Secretary: Dr. Joelle C. Hiebert, 299 Main St. Lewiston, Maine.

AMERICAN PEDIATRIC SOCIETY

President: Dr. Edwards A. Park, Johns Hopkins Hospital, Baltimore, Md.
Secretary-Treasurer: Dr. Hugh McCulloch, 325 N. Euclid Ave., St. Louis.
Place: Skytop Lodge, Skytop, Pa. Time: April 30–May 2, 1942.

CANADIAN SOCIETY FOR THE STUDY OF DISEASES OF CHILDREN

President: Dr. L. M. Lindsay, 815 Medical Arts Bldg., Montreal.
Secretary-Treasurer: Dr. Elizabeth Chant Robertson, Hospital for Sick Children, Toronto.

SOCIETY FOR PEDIATRIC RESEARCH

President: Dr. George M. Guest, Children's Hospital, Cincinnati.
Secretary: Dr. Mitchell I. Rubin, 1740 Bainbridge St., Philadelphia.
Place: Skytop Lodge, Skytop, Pa. Time: April 29-30, 1942.

SECTIONAL

INTERMOUNTAIN PEDIATRIC SOCIETY

President: Dr. Eugene Smith, 385–24th St., Ogden, Utah.
Secretary-Treasurer: Dr. W. C. Cheney, 837 Boston Bldg., Salt Lake City.
Place: Salt Lake City General Hospital. Time: First Thursday of each month, 8 p. m.

NEW ENGLAND PEDIATRIC SOCIETY

President: Dr. R. Cannon Eley, 319 Longwood Ave., Boston.
Secretary-Treasurer: Dr. James Marvin Baty, 319 Longwood Ave., Boston.
Place: Boston Medical Library. Time: Four meetings a year, occurring from September to May.

NORTH PACIFIC PEDIATRIC SOCIETY

President: Dr. S. G. Henricke, 4215 N. E. Hancock St., Portland, Ore.
Secretary: Dr. J. S. Backstrand, 333 Wyatt Court, Salem, Ore.

ROCKY MOUNTAIN PEDIATRIC SOCIETY

President: Dr. G. R. Fisher, 23 E. Pikes Peak Ave., Colorado Springs, Colo.
Secretary: Dr. Joseph H. Lyday, 1850 Gilpin St., Denver.
Place: Children's Hospital, Denver. Time: First Saturday of each month from September to May, inclusive, 2:30 p. m.

SOUTHERN MEDICAL ASSOCIATION, SECTION OF PEDIATRICS

Chairman: Dr. George M. Lyon, 955–4th Ave., Huntington, W. Va.
Secretary: Dr. William Weston Jr., 1428 Lady St., Columbia, S. C.

STATE

ALABAMA PEDIATRIC SOCIETY

President: Dr. M. V. Adams, 803 Government St., Mobile.
Secretary-Treasurer: Dr. William R. Britton, 4 Catoma St., Montgomery.

ARIZONA PEDIATRIC SOCIETY

President: Dr. Vivian Tappan, San Clemente, Tucson.
Secretary: Dr. Hilda Kroeger, Arizona State Health Dept. (Maternal and Child Welfare Division), Phoenix.
Place: Prescott. Time: April 1942.

ARKANSAS STATE PEDIATRIC ASSOCIATION

Chairman: Dr. C. B. Billingsley, 1425 N. 11th St., Fort Smith.
Secretary: Dr. R. E. Weddington, 1425 N. 11th St., Fort Smith.

CALIFORNIA STATE MEDICAL SOCIETY, SECTION ON PEDIATRICS

Chairman: Dr. William Belford, 233 A St., San Diego.
Secretary: Dr. John J. Miller Jr., 2398 Sacramento St., San Francisco.

FLORIDA STATE PEDIATRIC SOCIETY

President: Dr. Warren W. Quillian, 227 Aragon Ave., Coral Gables.
Secretary: Dr. George N. Leonard, 605 Lincoln Rd., Miami Beach.
Place: Concurrent with state association meeting at time of convention.

GEORGIA PEDIATRIC SOCIETY

President: Dr. R. C. McGahee, 1345 Greene St., Augusta.
Secretary-Treasurer: Dr. Don F. Cathcart, 478 Peachtree St., N. E., Atlanta.

HEZEKIAH BEARDSLEY PEDIATRIC CLUB OF CONNECTICUT

President: Dr. Ernest Caulfield, 683 Asylum Ave., Hartford.
Secretary: Dr. Edward T. Wakeman, 129 Whitney Ave., New Haven.
Time: Three meetings a year.

ILLINOIS STATE MEDICAL SOCIETY, SECTION ON PEDIATRICS

Chairman: Dr. Craig D. Butler, 715 Lake St., Oak Park.
Secretary: Dr. A. J. Fletcher, 139 N. Vermilion, Danville.
Place: Springfield. Time: May 19-21, 1942.

INDIANA STATE PEDIATRIC SOCIETY

President: Dr. K. T. Knode, 1105 E. Jefferson Blvd., South Bend.
Secretary-Treasurer: Dr. Mathew Winters, 621 Hume Mansur Bldg., Indianapolis.
Time: Two meetings a year.

IOWA PEDIATRIC SOCIETY

President: Dr. Mark L. Floyd, Children's Hospital, Iowa City.
Secretary-Treasurer: Dr. James Dunn, Davenport Bank Bldg., Davenport.

LOUISIANA STATE PEDIATRIC SOCIETY

President: Dr. S. G. Wolfe, 1560 Line Ave., Shreveport.
Secretary-Treasurer: Dr. W. C. Rivenbark, 1448 Louisiana Ave., New Orleans.

MEDICAL SOCIETY OF STATE OF NEW YORK, SECTION ON PEDIATRICS

Chairman: Dr. Norman L. Hawkins, 11 Public Sq., Watertown, N. Y.
Secretary: Dr. William J. Orr, 135 Linwood Ave., Buffalo.

MEDICAL SOCIETY OF THE STATE OF PENNSYLVANIA, PEDIATRIC SECTION

Chairman: Dr. John D. Sturgeon Jr., 22 N. Gallatin Ave., Uniontown.
Secretary: Dr. Elwood W. Stitzel, 403 Central Trust Bldg., Altoona, Pa.
Place: Pittsburgh. Time: Sept. 29-Oct. 2, 1942.

MICHIGAN STATE MEDICAL SOCIETY, PEDIATRIC SECTION

Chairman: Dr. Harry Towsley, University of Michigan Hospital, Ann Arbor.
Secretary: Dr. Leon DeVel, 110 E. Fulton, Grand Rapids.

MISSISSIPPI STATE PEDIATRIC SOCIETY

President: Dr. Harvey F. Garrison Jr., 315 E. Capitol Pl., Jackson.
Secretary: Dr. Guy Verner, 126 N. Congress St., Jackson.

NEBRASKA PEDIATRIC SOCIETY

President: Dr. Andrew G. Dow, 314 Medical Arts Bldg., Omaha.
Secretary-Treasurer: Dr. John M. Thomas, 301 N. 49th St., Omaha.
Place: As announced by Committee. Time: Third Thursday of each month from October to June, inclusive. Dinner at 6 p. m.

NEW HAMPSHIRE PEDIATRIC SOCIETY

President: Dr. MacLean J. Gill, 14 N. State St., Concord.
Secretary-Treasurer: Dr. Ursula G. Sanders, 46 Pleasant St., Concord.
Time: Twice yearly.

NORTH CAROLINA PEDIATRIC SOCIETY

President: Dr. Thomas M. Watson, Greenville.
Secretary: Dr. Frederick B. Haar, Greenville.

OKLAHOMA STATE PEDIATRIC SOCIETY

President: Dr. Ben H. Nicholson, 301 N. W. 12th St., Oklahoma City.
Secretary: Dr. Luvern Hays, 108 W. 6th St., Tulsa.
Place: Oklahoma Club. Time: 6:30 p. m., fourth Friday of each alternate month from September to May, inclusive.

SOUTH CAROLINA PEDIATRIC SOCIETY

President: Dr. R. B. Josey, 1517 Hampton Ave., Columbia.
Secretary-Treasurer: Dr. Wilson Ball, South Carolina State Health Dept., Columbia.

TENNESSEE STATE PEDIATRIC SOCIETY

President: Dr. Kinsey M. Buck, 1193 Madison Ave., Memphis.
Secretary: Dr. Gilbert Eblen, 611 W. Main Ave., Knoxville.

TEXAS PEDIATRIC SOCIETY

President: Dr. P. E. Luecke, 4105 Live Oak St., Dallas.
Secretary-Treasurer: Dr. John Ashby, 3610 Fairmount Ave., Dallas.

VIRGINIA PEDIATRIC SOCIETY

President: Dr. John M. Bishop, 511 Medical Arts Bldg., Roanoke.
Secretary: Dr. Edwin A. Harper, 301 Rivermont Ave., Lynchburg.

WEST VIRGINIA STATE MEDICAL SOCIETY, SECTION ON PEDIATRICS

President: Dr. Theresa O. Snaith, 450 Center Ave., Weston.
Secretary: Dr. Henrietta L. Marquis, 211 Bair Bldg., Beckley.

LOCAL

ACADEMY OF MEDICINE OF CLEVELAND, PEDIATRIC SECTION

Chairman: Dr. J. D. Nourse, 10515 Carnegie Ave., Cleveland.
Secretary: Dr. I. B. Silber, 10465 Carnegie Ave., Cleveland.
Place: Cleveland Medical Library Bldg. Time: October, December, February and April.

ACADEMY OF MEDICINE, TORONTO, SECTION OF PEDIATRICS

President: Dr. I. Nelles Silverthorne, 170 St. George St., Toronto, Canada.
Secretary: Dr. G. P. Hamblin, 2333 Bloor St. W., Toronto, Canada.

BRONX PEDIATRIC SOCIETY

President: Dr. David Zahn, 2474 Valentine Ave., New York.
Secretary: Dr. Harry J. Cohen, 975 Walton Ave., New York.
Place: Concourse Plaza Hotel, 161st St. and Grand Concourse. Time: Every second Wednesday of each month, except June, July, August and September.

BROOKLYN ACADEMY OF PEDIATRICS

President: Dr. Paul L. Parrish, 52 S. Oxford St., Brooklyn.
Secretary: Dr. Lewis A. Koch, 62 Pierrepont St., Brooklyn.
Place: Granada Hotel. Time: Fourth Wednesday of each month, except May, June, July, August and September.

Buffalo Pediatric Society

President: Dr. A. Wilmot Jacobsen, 187 Bryant St., Buffalo, N. Y.
Secretary: Dr. Richard A. Downey, 786 Forest Ave., Buffalo, N. Y.
Place: Children's Hospital, 219 Bryant St. Time: 8:30 p. m., first Monday of each month from September to June.

Central New York Pediatric Club

President: Dr. Frank van der Bogert, 111 Union St., Schenectady.
Secretary: Dr. Frank J. Williams, 58 S. Swan St., Albany.
Places: Various cities in New York. Time: Third Tuesday of April and September.

Chicago Pediatric Society

President: Dr. James H. Wallace, 715 Lake St., Oak Park, Ill.
Secretary: Dr. Henry G. Poncher, 1819 W. Polk St., Chicago.
Place: Children's Memorial Hospital, 710 Fullerton Ave. Time: Third Tuesday of each month, October to May, inclusive.

Cincinnati Pediatric Society

President: Dr. Lloyd K. Felter, 3144 Jefferson Ave., Cincinnati.
Secretary: Dr. Leo S. Friedman, 3586 Reading Rd., Cincinnati.
Place: Children's Hospital, Elland Ave., Cincinnati. Time: On call.

Dallas Pediatric Society

President: Dr. Bruce A. Knickerbocker, 3403 Hall St., Dallas, Texas.
Secretary-Treasurer: Dr. Floyd A. Norman, 4325 Cole Ave., Dallas, Texas.
Place: Bradford Baby Hospital. Time: 1 p. m., second and fourth Saturdays of each month.

Detroit Pediatric Society

President: Dr. Marsh M. Poole, 773 Fisher Bldg., Detroit, Mich.
Secretary: Dr. Donald J. Barnes, 773 Fisher Bldg., Detroit, Mich.
Place: Wayne County Medical Society. Time: 8:30 p. m., first Wednesday of each month from October to June, inclusive.

Fulton County Medical Society, Pediatrics Section (Atlanta, Ga.)

Chairman: Dr. Don F. Cathcart, 478 Peachtree St. N. E., Atlanta.
Secretary: Dr. Harry Lange, 478 Peachtree St. N. E., Atlanta.
Place: Academy of Medicine, 38 Prescott St. N. E. Time: Second Thursday of each month from October to April, 8 p. m.

Houston Pediatric Society

President: Dr. Raymond Cohen, 2300 Caroline St., Houston, Texas.
Secretary: Dr. Betty Moody, 526 Richmond Rd., Houston, Texas.
Place: College Inn, Houston. Time: Fourth Monday of each month.

Kansas City (Missouri) Pediatric Society

President: Dr. Edwin H. Schorer, 1103 Grand Ave., Kansas City.
Secretary: Dr. H. E. Petersen, Physician's and Surgeon's Bldg., St. Joseph, Mo.
Place: Kansas City General Hospital. Time: On call.

Los Angeles County Medical Association, Pediatric Section

President: Dr. Alonzo Cass, 1908 Wilshire Blvd., Los Angeles.
Secretary-Treasurer: Dr. Gladys Patric Shahovitch, 3936 Roderick Rd., Los Angeles.
Place: Los Angeles County Medical Headquarters, 1925 Wilshire Blvd. Time: Second Monday of February, April, June, October and December.

Medical Society of the County of Kings and the Academy of Medicine of Brooklyn, Pediatric Section

President: Dr. Irwin Schiff, 658 Eastern Parkway, Brooklyn.
Secretary: Dr. Henry Rascoff, 895 Eastern Parkway, Brooklyn.
Place: 1313 Bedford Ave., Brooklyn. Time: 9:00 p. m., fourth Monday of each month, October to April, inclusive.

Medical Society of the County of Queens, Inc., Section on Pediatrics

Chairman: Dr. A. A. Trivilino, 88-07–150th St., Jamaica, N. Y.
Secretary-Treasurer: Dr. Edith A. Mittell, 144–38th Ave., Flushing, N. Y.
Place: Queens County Medical Bldg., Forest Hills, N. Y. Time: Third Monday of October, January, March and May.

Medical Society of the District of Columbia, Section on Pediatrics

President: Dr. James M. Moser, 3751 Jenifer St. N. W., Washington, D. C.
Secretary-Treasurer: Dr. William A. Howard, 2222 Que St. N. W., Washington, D. C.
Place: Medical Society Bldg., 1718 M St. N. W. Time: 8 p. m., fourth Thursday of every month.

Memphis Pediatric Society

President: Dr. E. C. Mitchell, 1073 Madison Ave., Memphis, Tenn.
Secretary-Treasurer: Dr. Harry Jacobson, 1193 Madison Ave., Memphis, Tenn.
Place: John Gaston Hospital. Time: Quarterly.

Milwaukee Pediatric Society

President: Dr. John H. Reynolds, 1628 W. Wisconsin Ave., Milwaukee.
Secretary-Treasurer: Dr. F. J. Mellencamp, 324 E. Wisconsin Ave., Milwaukee.
Place: Milwaukee Athletic Club. Time: Second Wednesday of each alternate month, beginning with February.

New York Academy of Medicine, Section of Pediatrics

Chairman: Dr. Alfred Langmann, 108 E. 68th St., New York.
Secretary: Dr. Edith M. Lincoln, 600 Park Ave., New York.
Place: New York Academy of Medicine, 2 E. 103d St. Time: Second Thursday of each month from October to May, inclusive, 8:30 p. m.

Northern California Affiliates

President: Dr. Crawford Bost, 490 Post St., San Francisco.
Secretary: Dr. William A. Reilly, 384 Post St., San Francisco.
Time: Second Thursday of September, November, January, March and May.

Northwestern Pediatric Society

President: Dr. John M. Adams, 1009 Nicollet Ave., Minneapolis.
Secretary-Treasurer: Dr. Albert V. Stoesser, 205 W. University Hospital, Minneapolis.
Place: Minneapolis, St. Paul, Duluth and Rochester. Time: January, April, July and October.

Oklahoma City Pediatric Society

President: Dr. J. Byron Snow, 1200 N. Walker St., Oklahoma City.
Secretary: Dr. G. R. Felts, 1200 N. Walker St., Oklahoma City.
Place: Oklahoma Club. Time: Fourth Friday of each alternate month.

Philadelphia Pediatric Society

President: Dr. Paul B. Cassidy, 2037 Pine St., Philadelphia.
Secretary: Dr. Aims C. McGuinness, Children's Hospital, 1740 Bainbridge St., Philadelphia.
Place: College of Physicians, 19 S. 22d St. Time: Second Tuesday of each month from October to April, inclusive.

Pittsburgh Pediatric Society

President: Dr. Ellsmer L. Piper, 3708–5th Ave., Pittsburgh.
Secretary-Treasurer: Dr. Carl Ruder, 646 Washington Rd., Mount Lebanon, Pittsburgh.
Place: Pittsburgh Academy of Medicine. Time: Second Friday, alternate month from October to June, inclusive.

Richmond Pediatric Society

President: Dr. Stanley Meade, 913 Floyd Ave., Richmond, Va.
Secretary-Treasurer: Dr. Herman W. Farber, 501 E. Franklin St., Richmond, Va.
Place: Richmond Academy of Medicine, 1200 E. Clay St. Time: 8 p. m., third Thursday of each month, except June, July and August.

Rochester Pediatric Society

President: Dr. Herbert Soule, 122 Rutgers St., Rochester, N. Y.
Secretary-Treasurer: Dr. Jerome Glaser, 300 S. Goodman St., Rochester, N. Y.
Place: Rochester Academy of Medicine or arrangement by program committee. Time: Third Friday of each month from October to May.

St. Louis Pediatric Society

President: Dr. Maurice J. Lonsway, 3720 Washington Blvd., St. Louis.
Secretary-Treasurer: Dr. Mary A. McLoon, 408 Humboldt Bldg., St. Louis.
Place: St. Louis Medical Society Bldg. Time: First Friday of each month from October to June.

Seattle Pediatric Society

President: Dr. Frederick B. Joy, Stimson Bldg., Seattle.
Secretary: Dr. Sherod M. Billington, Medical Dental Bldg., Seattle.
Place: College Club. Time: Third Friday of each month from September to June at 6:30 p. m.

Southwestern Pediatric Society

President: Dr. Norman Nixon, 1136 W. 6th St., Los Angeles.
Secretary: Dr. Donald C. Shelby, 3780 Wilshire Blvd., Los Angeles.
Place: Jonathan Club of Los Angeles. Time: First Wednesday in January, March, May, September and November.

University of Michigan Pediatric and Infectious Disease Society

President: Dr. Campbell Harvey, 35 W. Huron St., Pontiac, Mich.
Secretary: Dr. Harry A. Towsley, University of Michigan, Department of Pediatrics and Communicable Diseases, Ann Arbor, Mich.

Westchester County Medical Society, Pediatrics Section (New York)

President: Dr. John B. Ahouse, 27 Ludlow St., Yonkers, N. Y.
Secretary-Treasurer: Dr. Elvira Ostlund, 64 Highland Rd., Rye.
Place: Grasslands Hospital, Valhalla, N. Y. Time: Third Thursday in October, December, February and April.

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